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WORLD'S LEADING SCIENCE-FICTION MAGAZINE

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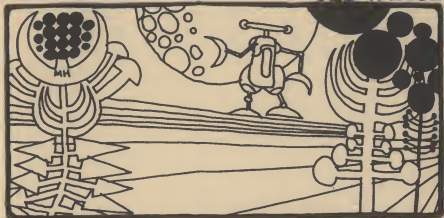
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EDITORIAL

Every so often we—the science fiction world—are “discovered” by some segment of the academic world or the mass media. Most often we have been the subject of graduate theses by students of sociology. Less often “experts” in the field of sociology or psychology have invaded our realm to exclaim over us.

About ten years ago, a woman’s magazine writer discovered her son’s interest in science fiction fandom, and, as apparently she was wont to do with all her son’s interests, she marched right in to “find out all about” us and, not so incidentally, to write an article about us for one of the leading magazines of that period. I later found out that her poor son had served as the source material for much of her livelihood over the years: at each stage in his growth from infancy, she published articles about his progress and, no doubt, her own excellency as a mother.

When I met her—in the course of her preparation of her article on science fiction

fandom—she had apparently long-since shed her husband and assumed his role. She informed me she’d had a long “chat” on the phone with Ray Bradbury, had talked to Dr. Margaret Mead about fandom (“She knows all about it,” she said; if indeed she does, Dr. Mead has had the good taste not to exploit her knowledge publicly), and generally set about to overwhelm me with her tenuous grasp of the subject. I was at that time in the midst of a legal dispute over a remark I’d made in a fanzine, and my interviewer was very persistent in attempting to gain the details from me, including in her repertoire of persuasion even polite blackmail. (I told her nothing, and the affair was later settled amicably.) Despite my growing dislike for the woman, I left in her care some rather difficult to replace copies of fanzines I valued—hoping that if she read them she might come to regard fandom as something more than an adolescent activity. Needless to say, she never returned them. Fortunately, her article was never published

either.

That was my closest brush with the kind of individual who seeks to exploit us and our enthusiasm for science fiction.

Almost twenty years ago a man published a book called *Seduction of the Innocent*. The man was Dr. Frederic Wertham; he had previously distinguished himself to the public through a series of articles in such publications as *THE READER'S DIGEST*, in which he sought to prove, over and over, on a simple cause-and-effect basis, that comic books were the prime cause of juvenile delinquency.

I wonder if you remember the stir his book made?

An amplification of his earlier short articles, it set out to "prove" the unredeemable vileness of comic books in a fashion which all but bulldozed the facts. Perhaps his most famous finding was that Batman was having a homosexual relationship with his sidekick, Robin, The Boy Wonder. A debatable point, surely, but he also insisted that this was obvious to the comic book readers of that period—and was leading them astray. One can only shudder at the thought of what he might have made of *The Boy Scouts Handbook*, had he only read *that* work instead.

I recall my own reactions to Wertham's charges and allegations: anger. I was then teen-aged, and a collector of comic books (along with an equally large library of old boys' books, sf pulps, and sf and mystery paperbacks). I had suffered throughout my youth the patronizing contempt of adults to whom comics were "trash," pure and simple. I bore up under the unremitting advice of well-meaning adults who informed my parents that my interest in comic books would stunt my reading abilities—that "all those pictures" would leave me with no interest in the printed word. (But then, I grew up mostly before

television...) Somehow I had survived such advice—had even, in fact, become a voracious reader of the printed word in nearly all its manifestations. But I might be pardoned for a certain residual paranoia about my interest in comics—and my hostility to such obviously shallow attacks as Dr. Wertham's.

The root of Dr. Wertham's thesis can be found in a recent statement of his: "I arrived at through careful clinical studies...the conclusion that human violence, which plagues us so much, is not a part of human nature—as so many claim—but can be reduced and eventually even abolished. That entails taking all factors seriously, including the glorification of violence in mass media."

Two decades ago, the focus of his interest was comic books. In a sequence of remarkably fatuous "case studies" of juvenile offenders who had come to his attention, Wertham attempted to link their problems with comic books in a very forthright fashion: he claimed that delinquents took their ideas from crime comics, that a girl who exposed herself sexually to men did so because of the comics she read, and that a boy who had leapt from a roof was trying to fly "like Superman." I quote these examples from memory, but my memory of his book remains persistent to this day—along with such items as his claim that if one examined the rendering of a man's biceps quite close up in one panel of a comic book one would find a "dirty picture," and that most kids knew about this. (He included a cut of this "dirty picture," and it took a powerful imagination to isolate the details necessary; one wonders if the good doctor ever himself took a Rorschach test...)

Wertham's book triggered a massive national witch hunt. It was the McCarthy era, and the climate was quite favorable. I

(CONTINUED ON PAGE 142)

Three humans came back to Earth from the fungoid world of Nacre, bringing with them eight mantas—eight intelligent alien beings. The agent Subble had interviewed them and almost too late understood the implicit menace of those eight fungoid aliens. Now, after a terrible pogrom enacted solely to contain and capture them, the three humans—Cal, Veg, and Aquilon—found themselves with the surviving seven mantas in a capsule orbiting Earth in the sterile safety of space. They expected to be returned to the mist-shrouded planet Nacre. Instead, they were catapulted into the side-time world of Paleo, home of Orn . . . Piers Anthony interweaves two compelling stories in this unusual sequel to his famous novel, Omnivore.

ORN **PIERS ANTHONY**

Illustrated by **MICHAEL WM. KALUTA**
(First of Two Parts)

ORN WOKE EXHAUSTED. His body was cold and somewhat sticky, and his muscles were uncertain. He could not remember how he had come here, but he knew it was not safe to yield to his confusion now.

Something was wrong. He lifted his head and forced open eyes that had been sealed shut by goo. At first the brightness hurt him; then it settled to a wan glow as his sensitive eyes protected themselves. He was in some kind of cave, and it was twilight: the start or end of a day. That much he grasped, remembering the inanimate cycle.

He sprawled disreputably across cold stone. He wedged four sticky, clumsy limbs under his body awkwardly, then rose to stand with greater confidence on two.

Yes—in the gradually brightening light

he made out the flat floor and naturally corrugated ceiling, both descending into darkness beyond him. Nearby was a voluminous tumble of dehydrated stalks: a nest, containing a single monstrous, elongated egg.

Orn brushed against it delicately. Cold—nothing would hatch from this. Beyond it and the nest were rocks and bones and other debris of indeterminate origin. All dead.

He walked unsteadily toward the light, avoiding the scattered joints and droppings and teeth and dehydrated leaves and sticks that lined the track. The exertion brought vitality to his body, and he began to feel the proper comfort of internal warmth. But with this physical improvement his mind seemed to backslide, to lose coherence. Strange visions passed through his awareness,

incredible peripheral memories that could not be his own, that faded as he became aware of them.

He relaxed, not attempting to scrutinize the twitchings of his brain, and then the pictures perversely took on full substance.

Memory. It began far, far back in the half-light, wetter and warmer than since. He floated in a nutrient ocean and absorbed what he required through his spongy skin. He reached for the light, a hundred million years later, needing it . . . but recoiled, burned, finding it too fierce to approach. He had to wait, to adapt, and this did not come easily. He held his position and ate what he could and expanded his mass slowly, very slowly, a billion years slowly. But somehow the larger he grew, the greater became his hunger. He could not get enough nourishment. Never enough, never enough . . .

The odd memory dissipated as he turned the corner and stood in the stronger light at the cave's mouth. Green shrubbery showed beyond, and the intense gray-white of the sky. This was morning: not the steamy dawn of twenty million years ago, but a chilly and empty rising of the sun.

The corpse of a mighty bird lay astride the opening. In life it might have stood so tall as to brush the very ceiling of the cave, and it had a thick, slightly-curved beak, stubby wings, and cruel, forward-reaching talons. Under the disarray of gray feathers the long strong muscles of the thighs still bunched, as though it had been running—or fighting—when it died. The powerful neck was twisted so that the head stared stiffly to the side, and dried blood fouled the upper plumes. One eye peered into the sun, the orb already shrunken with the dehydration of its tissues. Once-handsome tail-feathers were broken off in the dirt.

There had been a desperate battle, and



the bird had lost, but the victor had not paused to consume the flesh. This too was strange.

Looking at her—for he recognized the corpse as female as readily as he was coming to identify all the things he saw—Orn felt a vague alarm. He did not conjecture the meaning of his own awakening beside the abandoned nest of this creature, nor did he wonder what had vanquished her. Instead he searched his troubled memory—and found the bird within.

Sixty, eighty million years ago the hot-bodied aves had completed their divergence from their rep ancestry, conserving the produce of their internal furnaces by means of scales lengthened into fluffy down. They lived in tall pines and rocky gullies where it grew cold at night, and needed continuous warmth in order to stay alert and alive in those windy heights. They spread all four legs with strengthened coverts to add buoyancy, and leaped and glided to safety at the slightest provocation. For some of the predator reps could climb, and all were hungry. The tree-leaper who fell to the ground was dead, and not from the fall.

But soon one line had grown too large to escape through the air, and while its light-boned, light-brained cousins ascended ever higher into the sky and pumped their expanding front wings and let the hind wings shrivel into claws, this nether line planted its hind limbs firmly in the dread earth and discarded flight. Here only the fleet of foot survived at all, and the strong of beak, and the firm of memory. They had to run at times, and fight at times, and to know without hesitation when each was appropriate, in the stronghold of the reps.

They succeeded. They were able to forage in colder areas than the reps, and to travel at night. Other landbound lines diverged.

All this Orn knew, his memory triggered

by the need, by the sight of this ultimate bird. She was not a creature of terror to him, but of history, come fifty million years along her line to die so brutally before this cave. Orn did not sorrow for her; such was the nature of existence. The weak, the careless, the unlucky—these died and were replaced by others.

He stepped around the body and stood in the day. A towering pine ascended from the nearby turf, as ancient and grand in its fashion as the bird. The ground was covered with tall ferns, and cycads shook their fronds in the light breeze. Similar plants had dominated the landscape for a very long time, Orn knew. Only recently had others come to contest the land, and those others had not been very successful here.

He scratched the ground experimentally while the sun took the chill off the land. His digits were feeble and tender compared to the thick horned toes of the dead bird, but a few inefficient scrapes exposed the underlying structure. Beneath the surface leaves and twigs and needles lay a spongy humus teeming with its own awakening life. He put one eye down and concentrated, bringing the miniature landscape into focus.

Here were cricks and roaches and black-shelled beets busily scavenging microscopic debris. Tiny springs, those wingless arths who jumped by flipping forked tails against the ground—these too scrambled for cover, disliking the sun.

Orn knew them. The arths had diverged very long ago, so far back that he had no memory of their early evolution. Somewhere, sometime in that hot sea as he struggled between the freezing darkness and the burning light and satisfied his compelling hunger by growing into an absorptive cup, a cylinder, a blob with an internal gut; as he extruded fins and nascent flukes and swam erratically after game, and formed eyes to harness the light at last and

gills to breathe the water and the lateral line system to navigate by—somewhere during that complex billion-year development that preceded his rise to land, the little arths had taken their own mysterious but highly successful course. Now they crawled and flew and fashioned webs and hives and cocoons and burrows and lived their hasty lives in many-legged, many-winged, virtually mindless certainty . . .

Orn moved on, observing everything but questioning nothing. Timorous hairy mams scooted from his path, afraid of him; these represented innocuous lines. He traveled a shallow valley that led gradually downward toward a body of water. Soft, flat vegetation of the new type crowded the edge and floated on the surface, an increasing amount of it bearing flowers. Small fish flashed where a streamlet flowed over naked stone and coursed between round mossy rocks; pisces, an ancient and multiple line, and now and then one came to kiss the surface of the lake.

Once more Orn remembered: the flowing water was a different medium from the passive depths of the sea, as different in its fashion as air from land. The flaccid flesh of the calm ocean depths had had to develop a stiffened but flexible rod of gristle along its length, lest it be tumbled into danger by the new phenomenon of current. To this gristle the expanding muscle tissue was anchored; progress was no longer random but forward, against the flow. Before his line diverged from that of the pisces, they had invaded the less-habited regions up that current, and changed in the doing of it. The spinal rod protected increasingly important nerves, for coordination had become essential; then that gristle hardened into cartilage and on into bone. The skeleton was the gift of flowing fresh water, and so the land had already affected life in the sea.

But the rivers of the past were fast and

shallow, and they flowed from the bleak inhospitable mass of substance that formed the continent, and from time to time the ambitious swimmer was stranded in some stagnant pool. He had to gulp life from the surface, even as these fish in the lake did now, and hold the bubble in his mouth in an effort to absorb from it the breath that had left the water. But his mouth was now encumbered with jaws and teeth and tongue, all needed for feeding. Thus he was forced to develop a special cavity in the throat, a bag, a chamber—a lung. When the water of his isolated pool finally sank to nothing, his fins had to strengthen into four stout limbs to support the body against the gut-wrenching land gravity, and the new lungs sustained life entirely. It was a brief but awful trek, that first journey over the cruel land, and almost every fish who tried it perished—but for that fraction who were determined and strong and fortunate—Orn's own line—it won reprieve in a deeper, fresher pool.

Orn remembered the original home: the water. He remembered the gradually lengthening adventures over a land inhabited only by pulpy vegetation and rapidly scrambling arths, until most of his life was spent upon it and he was no longer a true fish. He remembered the hardening of the rind around the soft eggs, until they withstood to some extent the ravages of sun and air. A small step, but significant, for it meant that the sea had let slip its last lingering hold. A complete life-cycle could occur without the intervention of the ocean.

By the shore of the lake he found the body of the male bird. This one, too, had perished violently—but unlike his mate, he had taken his enemy with him. A long, powerful rep lay belly-up on the sand, its tail in water, its eyes two bloody sockets, its gut an open cavity. Gore on the beak and talons of the bird betrayed the savagery of

its attack, here at the fringe of the rep's demesne; but the scattered feathers and blood on its breast showed that the teeth of the croc had not fastened on empty air.

Had the rep reached water before the bird attacked, the rep would have won the battle easily. But it had not, perhaps because of wounds inflicted by the female bird. Now all three combatants were food for the clustered flies.

The croc: as Orn gazed at it he comprehended the course it had taken since its ancestors branched away from his own, more recently than the fishes. His line had stayed on land and in the trees before returning to the ground, climbing and leaping from branch to branch, becoming warm of body, omnivorous of diet, and highly specialized of brain. But the croc had returned part way to the water, hiding behind horny skin, preying on anything that fell in or strayed too near.

This time the croc had ventured too far from its region of strength, perhaps seeking to raid the enormous eggs in the cave-nest while one bird was absent, thinking the other would not fight . . .

Orn did not attempt to work out the details further in his mind. He was weak and tired and alone and now ravenously hungry. His heritage of memory finally closed the gap between his evolution and himself, and he understood that there would be no outside help for his distress. He was a member of the most advanced species yet to tread the earth of this world—but he had nothing more to sustain him at the moment than his generalized body and the knowledge within him of the genesis of living things.

He did not pause to consider what would have happened had the croc reached the two eggs before the parent-birds returned, or the happenstance that the elder egg had been on the verge of hatching the instant

the fatal encounter took place. The mother's warmth had been taken away at the critical moment, forcing activity or death for the chick. He did not ponder the coincidence of destiny; he did not contemplate revenge. His mind was designed for far-reaching, comprehensive racial memory rather than true thought. Racial memory was his instrument of survival—a device like none ever employed by another species.

Orn shook out his stubby, still-featherless wings and advanced on the piled meat before him. Flies swarmed up as his beak chopped down. He was hungry, and there was no one else to feed him.

Chapter 2: Aquilon

FOR TWO DAYS they orbited: three humans and seven mantas. The capsule was tiny for ten occupants, the sanitary facilities embarrassingly direct, the food monotonous. But the mantas were siblings who could range for leagues or freeze in place for hours without suffering, and the human beings were two men and a woman who was said to be beautiful. Because the mantas were of fungoid metabolism (though this description was about as precise as "heated protoplasm" might be for Aquilon herself), their body processes complemented those of the humans, freshening the air to a certain extent. It was a tidy circumstance, though machine revitalization was still essential for oxygen.

Nevertheless, it was crowded.

By the time the shuttle came to grapple the capsule and haul it in for decontamination, the trio had talked out almost everything un consequential. They had been unable to approach the subject of the rights and wrongs of a certain agent's seeming suicide, or the demise of the eighth

manta, or the interpersonal relations of the trio itself. The horror of what had passed was too fresh, the emotional wounds still smarting; there would be time enough to work it all out on the planet Nacre, where so much of it had started.

The Mantas faced each other in a ring, or perhaps a seven-pointed star, or yet again a hemisphere, depending on how one viewed the topology of the capsule's interior. Each gazed for a period of seconds into the eye of his opposite, three pairs engaged at all times, one individual sitting out. Then the pattern would shift for new combinations. What philosophies they contemplated so raptly Aquilon could not guess, but certainly something was being discussed at length. She cursed her female curiosity, but did not attempt to query a manta.

There was a jolt as the capsule was caught and braked. The spin that had provided a kind of gravity stopped, and they all had to cling to handholds to keep from somersaulting in free-fall. The mantas had no hands, but each had a mass approaching fifty pounds in normal gravity; they bounced against the wall and each other like so many huge rubber balls. She could almost laugh.

"Prepare for decontamination," the speaker said.

Veg was braced before the exit port, automatically assuming the lead for what promised to be an unpleasant procedure. They had each been through it before, of course—but familiarity did not bring composure. Decontamination covered a good deal more than the external physique.

Aquilon smiled, though not with her lips. She was tall for a woman, but Veg dwarfed her. He was as powerful a man as she had ever met, with one exception she preferred not to think about. She peered at his broad back through the mesh of blonde hair waving across her face in this sudden free-

fall. Who would normally suspect this two-fisted roughneck of a compulsive passion for the wellbeing of all living creatures? Yet it was so. Only against men did Veg use his muscle, and then by way of demonstration rather than compulsion, except in rare instances.

She removed her gaze, and it fell naturally on the other man. He was superficially the opposite of Veg. Cal was tiny—hardly up to her own shoulder, and thin and weak. For a time there had been doubt that he would live at all, since his diet was severely restricted and their trek on Nacre had been difficult. Yet his mind was frighteningly sharp, capable of appalling concepts, and he had the courage of his strange convictions. Cal feared death so little that he seemed almost to worship it.

Aquilon loved both men. The physical side of her leaned toward Veg, the intellectual toward Cal. Yet it was Veg's intellectual example she followed now, for she had not eaten meat, fish or fowl since returning to Earth from Nacre. She needed something intangible that she had not been able to find or assess, except that it related to them. And both men believed they needed *her*—but the truth was that they needed each other, and she was only in the way. They had been good companions before she met them—better than they were now, though neither man spoke of the subtle, insidious change occurring. Could she abscond with Veg's body and Cal's mind? Was she selfish enough to interpose her femininity (more bluntly, her femaleness) between them, drawing to herself the life-preserving dialogue they had for each other?

It would be better if she stepped out of their lives entirely. If only she had the ability to devise a clean exit, and the emotional stamina to follow through . . .

Now, she thought sadly. Now, during the

decontamination. They segregated the sexes for that, thank God, and she could simply request a transfer to some planet other than Nacre, and she would never see them again, even for a fond farewell. It would break her heart, but she had to do it.

"Cancel," said the speaker, and she jumped guiltily. The port remained sealed. "Your unit is to be transshipped entire. There will be no processing."

Veg looked about, perplexed. "This isn't SOP," he said.

Cal frowned. "That business below may have put us in a special category. One of their agents died—"

"Subble," she said tersely. "Subble died." She had only known the man, really, for four hours, and known him as an enemy. But it was as though a lover was gone.

"And the problem the manta represents is critical. They may have decided not to expose any of the station personnel to—"

"But what about the *Earth* germs?" Aquilon demanded. "Decon is both ways. We don't want to infect Nacre with—"

The communication screen glowed. A face appeared, supported by the lapels and insignia of the Space Police. "Your attention please. Your attention please."

"Does he mean us? Does he mean us?" Aquilon inquired facetiously in the same tone. She resented being treated impersonally.

The face on the screen frowned. "This is a live transmission. I am addressing you three in the capsule. I can hear you."

Aquilon closed her mouth, suddenly embarrassed.

"Please respond as I call your names," the man said. "Vachel E. Smith."

There was a silence. Aquilon noted Cal struggling to avoid a smile. Veg did not like his proper name, and seldom answered to it. After the tedious confinement here, he was even less likely than usual to be tractable in

the face of authority.

"Vachel E. Smith!" the official repeated impatiently.

"What's *your* name, noodlebrain?" Veg demanded. This time Aquilon did let out a noisy breath, attracting a momentary glance from the interrogator. She felt giddy, as though she were a schoolgirl testing the grouchy teacher. Confinement and near-free-fall could do that, particularly after the horror they had so recently experienced on Earth. They were all acting like gradeschoolers—but she felt like enjoying it while she could. It took her mind off what she would have to do.

The man in the screen brought up a clipboard and made a checkmark. "Deborah D. Hunt?"

Suddenly Aquilon appreciated Veg's ire. She had fallen out of the habit of using her own name since meeting Veg and Cal, and the derogatory nickname imposed on her during a childhood illness had become her badge of honor. She even signed her paintings with it. Now her real name sounded strange and obnoxious, an epithet rather than an identification. She preferred not to acknowledge; surely "Aquilon" was listed on the officer's chart, for it had been given that way to Subble for his investigative assignment.

Subble, again. Why couldn't she get him off her mind? He had been no more than a single government agent, one of thousands, all virtually identical. He had been doing a job. No more.

The officer made another check. "Calvin B. Potter?"

"Present," Cal said, not acceding to foolish gestures. "All present. What is your business with us?"

"It is my duty to inform you," the officer said, "that computer headquarters has recommended that you be assigned to a new mission. You will not be returning to

Nacre."

Aquilon exchanged glances with the two men, and the mantas looked at each other. The harried officer was having the last laugh after all!

"In fact, you will not be visiting any of the listed planets, and it is unlikely that you will ever return to Earth. This is not to be considered an exile so much as—"

The voice continued, but Aquilon tuned it out internally, horrified. Banishment, not only from Earth but from all known colonies! So that was their punishment for the trouble the mantas had caused by their presence on Earth. She should have known that the powers that governed the planet would not destroy several billion dollars worth of development and landscape and wipe out a number of innocent lives—that they would not do this and then merely reprimand those who were to be the scapegoats. The trio had broken the law by importing unauthorized alien creatures to Earth, as many travelers did. They had not intended any harm—but this time great harm had come.

No, she could not protest lifetime exile. Worse things were possible. She had wanted desperately to leave Earth again—yet now that her wish was being granted, she felt perversely nostalgic. She did not *like* Earth or feel at ease upon it—but it still was harsh to be denied it for life.

However, that did not really affect her decision to separate from the two men. That had made it impossible for her to go to Nacre anyway.

"... first habitable alternate, as determined by soil, sea and air samples," the officer was saying. She had missed something important! "But there are several problems. First, our connection is tenuous. We can ferry any amount of material over, but only when the phase is proper—and that's infrequent. Second, we can not alter

the point of contact without risking complete severance, and it could take us a century to re-establish contact if we lost it now."

That didn't sound like ordinary space travel. But he had used the word "alternate." Could this mean—?

"And, unfortunately, this contact occurs under the ground. We have sent in borers to open passages to the surface, but another complication—"

She tried to pay attention, but her mind refused. An alternate world! This was exploration of an entirely different order. But if it were another Earth, why was it the "first habitable"? That implied that there were others unfit for human occupation. What true "Earth" could be unfit, except a devastated one? And even for another Earth, there should be decontamination processing; a virus virulent on one world should thrive on the other, if introduced.

No, she did not like the smell of this.

Cal's silent touch on her thigh jogged her to attention. He was not looking at her, and she would have supposed the contact to be accidental had she not known that nothing Cal ever did was accidental. Particularly not a goose with the thumb. She followed his gaze.

There was a map on the screen—a globe marked off with meridians of longitude and latitude, as though it were the Earth proper. But the continents and great islands were strange; it was obviously a different world.

Cal touched her again. Then she understood. She unobtrusively brought out her pad and brush and quickly sketched the outlines of the map. As she worked, the geography was replaced by the face of the officer. But she held the prior image in her mind, employing the trained short-term eidetic memory that helped make her the artist she was, and continued to work on the picture. Cal would have good reason for this

subtle directive—reason he did not want the officer to know.

She put the finishing touches on the map as the dialogue continued, then quietly put the pad away. What secrets had Cal read in this seemingly routine illustration? She was now alive with female curiosity. But how would she learn, if she were to part from the two men now? For that matter, how would she deliver the map to Cal? She could not pass it over now without giving away the show.

"Your assignment is to enter this alternate and make casual survey of its flora, fauna and, as far as practicable, its mineral resources. You'll be supplied from Earth, but there may be danger. You'll be expected to report—"

"Yeah, we know the route," Veg said. "We did it on Nacre, remember?"

The officer bore with this insolence. "Radio relay to the transfer point, where the recording will be brought back at such time as the phase permits, probably within two months. Analogous but not identical to your prior—" He paused. "I have just been informed that an excellent contact has developed in the past few minutes. Perfect phase, but it won't last long. We may have to wait a month for another, so we'll act immediately." He paused again, verifying instructions from an offscreen source. "The port will open. Move at once to the transmission chamber. Good luck."

Once more they exchanged glances. This was too sudden, too convenient; even Veg realized that. There was something they were not being told. Ordinarily the wheels of Earthly bureaucracy preferred a month to a minute for even a minor decision. Why should—?

The port opened.

Before the humans could move, the mantas did. Three of them angled around Veg and launched through the hole, flaring

into the flying shape as they emerged into the pressured connecting tube. There were no other space-locks here; the passage entered the main station directly. The three were out of sight in a moment.

"What?" Veg exclaimed.

Then he piled out after them, determined to find out what they were doing. Cal and Aquilon followed. The four remaining mantas stayed in the capsule, motionless.

Shouts and noises sounded ahead. Aquilon pulled herself along by the deep corrugations of the tube, floating after the men. She was surprised the mantas had been able to move so well in free-fall—though she realized now that she thought about it that it was air-resistance that stabilized them, not gravity. They were like powered kites, perpetually tacking against the wind, except that they were the ones doing the moving, not the air. One pushing foot, one sail—

There was gravity inside the station proper. A guard was rolling on the floor of the passageway, clutching his hand. Aquilon stopped automatically to help him—and recognized the clean wound of a manta attack. The manta's tail was a deadly weapon, capable of etching glass—or of severing the human hand from the human wrist. In this instance the hand had only been cut. She saw the anesthetic gun on the floor and realized that the manta had merely disarmed the man. Few people could fire before a charging manta struck.

But why? Why had those three mantas bolted?

"They were going to ambush us," Veg said angrily, watching the guard. "Kill us out of hand—"

"Ridiculous," Cal snapped. Somewhere down the way there was a continued commotion, and cries of anguish. "There are innumerable ways they could have dispatched us and the mantas without ever

releasing us from the capsule, had they wanted to. Those three mantas provoked this."

"Then why did that bastard have his gun drawn?" Veg demanded. "He never could have reached it if he waited until he saw them."

He was right. The guard had to have been waiting with the weapon ready, or he would have been struck down with it still in his holster. Or, more likely, not struck at all, since the manta would not have *had* to disarm him. But Cal was right too, for it was a sleep-gun, not a kill-gun.

Then she remembered: no deadly weapons were permitted in a normal orbiting station. The risk to personnel was too great. But that answered only the smallest part of it. The guard could have been instructed to stand by with weapon at the ready, just in case; that did not necessarily constitute aggressive intent. He would have tried to use it when he saw the horror-shape of the manta coming at him, however.

She helped the guard to his feet. "Better get over to sick bay, mister. You hand's laid open to the bone, and that's arterial bleeding. Next time remember: never point a weapon at a manta. They know what guns are, and their reflexes are faster than yours."

Dazed, the man departed. She wondered how it would have turned out had the guard been an agent. Agents' reflexes were super-fast, and with the gun already drawn—but the mantas had obviously been ready for trouble. Could there have been such an encounter between Subble and Pent, there on the defunct island? Had Subble won, then been killed by the others? She really would have to inquire about that.

"I think we'd better get back to the capsule and wait," Cal said. "We weren't ambushed—but we weren't told the truth, either. I'm sure the mantas had reason for

moving out like that. Notice how neatly executed it was—three took off, four sat tight."

They returned with alacrity. The four mantas remained, immobile as the fungi they were kin to. Somewhere in the bowels of the station a commotion continued, showing that the three were still on the rampage. The screen in the capsule was still lighted, but now no face showed.

Cal faced the mantas. "All right, comrades—what is your purpose? Are we in immediate danger?"

One of the four flexed its tail twice, making a double snap: the signal for "no."

"Maybe they went berserk!" Veg cried. "Being cooped up for so long—"

Three snaps: question mark.

"Berserk," Cal explained, first to recognize the problem. "Going wild, acting unreasonably, making unnecessary trouble. A form of insanity."

Again the tail: No.

"Find out whom we're talking to," Aquilon suggested, wondering how long they would be allowed before station personnel closed in. "And who's left." She was not in the line of sight of the answering manta, but it made no difference. They had no ears, yet picked up human speech and other sounds quite nicely by seeing the compressions and rarefactions of the atmosphere that comprised sound. In effect, they could hear with their eyes—and very well, too.

Four snaps, answering her implied query. "Diam," she said, recognizing the code. The four-sided symbol, the diamond.

Another manta moved: two snaps. "Circe," she said. "The two-sided symbol—inside and outside. I'm glad you're still here." It was a foolish sentiment, but it did seem to her that she could tell her erstwhile companion from the others, and that Circe had more personality, more feminine

attributes.

A third snapped: six. "Hex," Veg said. "My pal. I knew it was you. You have more savvy than those others."

Personification, she thought.

And the last: seven. "Star."

"That means Lin, Tri and Oct are gone," Cal said. "But we still don't know why. We weren't in physical danger—none that we weren't in all along, at least. They must have had a reason, just as the station personnel had one for rushing us. I think we'd better discover what that reason is. I wish we'd taught them Morse code."

"The mantas only learn what they choose to learn," Aquilon said. "We're lucky they communicate at all. They never did before."

"Your attention please." It was the officer on the screen again. "There has been a disturbance."

"Now he tells us," Veg muttered.

"Your beasts attacked station personnel. We had understood they were tame."

"That's why you had guns on 'em," Veg said sarcastically. "Real brave."

"How can civilized individuals be 'tame'?" Aquilon demanded in her turn. "Do you have tame men, tame computers?" But she wondered. She *had* thought there had been an understanding with the mantas, and this breach of manners didn't jibe. Why had they done it?

"What happened to those three?" Cal asked, more practical.

"One is dead. The men cornered it with bayonets and stabbed it through the eye. The others—"

Aquilon flinched, knowing how terrible a wound of that type was to a manta. The eye constituted the substantial majority of its apperceptive mass; a blind manta was virtually a dead manta, except for the suffering.

"How many men dead?" Cal inquired

softly.

"No fatalities. Our men are trained for trouble. Several lesser casualties, however—mostly cuts on the hands."

Thank God, she thought. The mantas weren't on a killing spree. They were merely trying to avoid capture. But again: why?

"We're in a hurry," the officer said. "Ordinarily there would be severe repercussions—but the phase is beginning to slip. Can you keep your remaining animals under control?"

"Yes," Cal said before anyone else could comment. Aquilon understood, then. The station personnel still thought the mantas were merely pets—dangerous when out of control, but basically subject to man's will. The sudden demonstration of the mantas' tactical abilities had been deemed a stunt, no more. If these people realized the truth, after what had just happened—

And she had been trying to blab it out! She could have cost the lives of all the mantas!

One more reason to separate from this group, to go her own lonely way. They would survive better without her.

But Veg was hustling her along, and this time the mantas followed docily behind. They had made their move, whatever it was. She was unable to make hers.

She felt a terrible relief.

Chapter 3: Orn

IT WAS AN island he dwelt on. Orn's explorations had long since verified that no exit from it existed for him, since he could not fly and did not care to swim. But his memory informed him that this bit of land, that he could cross many times in the course

of a single day without fatigue, was not the total of the world. He was able to appreciate its recent history to a certain extent because there were evidences of many prior nestings of his species, and his memory suggested that land had been here several million years ago. Spot details, such as the cave he had hatched within, were too transitory to register; but the body of rock itself was stable enough to be familiar.

Orn's ancestors had ranged the entire continent, mapping its shifting configurations in the memory of fifty million years. Orn saw portions of the whole whenever he contemplated the local landscape. He was aware that this island was a tiny fringe of the great land-mass, a part of it really, despite the gulf of sea cutting between them. The island rode the continent's western perimeter. He was aware too that the continent itself was moving, and had already traveled many times the breadth of the island, though slowly. Ponderous upheavals had split the original continent apart, fragmenting it. Though changing bridges of rock connected the new sub-continents, the last of these had severed hardly ten million years ago, isolating an entire ecological population. The influx of new species of animal from far regions had halted, ranging-grounds had become comparatively restricted, and the increasing violence of the geography had led to the decline of certain established creatures and the sudden rise of others. The great reps had largely vacated the cool northern regions and the mountainous terrain, though they still predominated in the southern marshes. The tiny mams had overrun those deserted areas and, more importantly, the orders of aves had flourished. A new balance of nature had occurred.

Orn's memory faded out for the most recent period. It required many generations

for the racial record to become firmly established, so that he was clearest on the situation of five to twenty million years before. Prior to that period his memory became more general, being specific only in relation to his own line. Even much of that had faded as he grew farther away from the egg; he no longer remembered the impressions of swimming or conquering the land.

The more recent images were incomplete. Some were clear but uncertain, others foggy, and some so transient as to be meaningless. Had his parents lived, they would have educated him to the specifics of contemporary existence; memory was less important than example, for day-to-day life. Lower creatures like the arths made do entirely on memory—but this would not do for himself. His own experiences would be added to that mass of memory already inscribed within his genes, strengthening some images infinitesimally and weakening others that were no longer applicable. His descendants would benefit accordingly.

The western section of this traveling subcontinent had buckled as it moved, tripping over the sea-floor it overrode in its geologically precipitous traverse. An expansive shallow interior sea-arm had drained away as the land wrinkled into a tremendous mountain range instead. Thus one natural barrier had been replaced by another, and the range was still rising as Orn's memory faded out. The flora had changed rapidly here; flowering plants had spread explosively over the highlands, leaving the old varieties to the warmer lowland coastlines.

Orn knew the geologic history of his present island mainly by extrapolation from precedent. This was a volcanic framework. It had risen out of the sea as the residue of frequent emissions of liquid stone and airborne ash. From a single cone it had

grown to three, all feeding on that same restlessness inspired by the larger motion of the continent much as thunderstorms fed on the motions of large air-masses. Though two cones had subsided, the third and smallest still erupted periodically over the centuries. Orn had seen the traces of its erstwhile furies, recognizing the typical configurations though the vegetation now covered them richly. It was from its subterranean furnace that the heat had come to make the island pleasant; Orn's memory implied that the surrounding geography grew distressingly cold in winter. Too cold for his kind to nest.

It was summer now, better than a year after his rude awakening here. Orn had grown to better than half the mass of the avian parents he had never known in life, and whose rotting flesh had sustained him those first difficult days after hatching. They had done that for him, at least: given him food when he was too small to hunt effectively himself. Now his feathers had filled out comfortably, white around the neck and handsome gray on the breast, and his wings and tail were sturdy. He could twist his neck to reach any part of his body, and his beak was a respectable weapon. His thighs were well-muscled for running, and his flesh well-toned. He had grown up strong and fleet and smart; had it been otherwise, he would not have grown up at all, even in this protected locale.

He was aware that most birds of his type had parental care in the chick state, and were sheltered from the savagery of climate and predators. He had suffered, at first. But he was also aware that his particular parents had chosen their nesting site well; few really dangerous animals lived here. The croc that brought tragedy had come wandering from another isle, a loner, and with its demise the area had been rendered safe again. Occasionally Orn had seen another such

croc swim by, but he had hidden and it had gone on. Yes—his parents, by their sacrifice, had made it possible for him to survive even without their immediate care. They had been resourceful birds.

Once, he knew by the traces, many couples had nested here, and many eggs had hatched. Now he was alone; somehow his species had declined over the millennia along with the reps. Oh, there were birds on the island—more lines than ever before—but none of his own species. He did not wonder why the same circumstance that encouraged a general avian radiation simultaneously discouraged his particular line; he merely knew it was so. He did feel a general loss, a loneliness, and was from time to time disturbed by it.

Now, as he grew into his second year, he became aware of a more immediate problem. The island underpinning was building up to one of its periodic outbursts. He could feel the ground shuddering and swelling, and he could see and smell the increasing gases emerging from the active cone. He read the multiple signals: *danger*.

The other creatures were aware of it too, but largely helpless. Fish floated belly-up in ponds grown hot; tiny, warm-bodied multis scrambled by day in the open, driven from their caved-in burrows. Birds hovered in the sky, afraid to perch for long on uncannily vibrating branches.

The aves at least could fly; Orn could not. Had he thought in those terms, he might have envied his distant cousins their ability to depart so readily. But he knew that physical escape was only part of it; their home was being destroyed as much as his own was. He paced the shore facing the mainland, peering at the mountainous scape so near by air, so far by water. He was not an efficient swimmer, and the sea had its own threats.

Yet even the mainland was restive. Dark

clouds drifted above the mountains as other great cones vented their substance. There were tremors not of the island alone, but of the area, and the tide was off schedule.

He had to remove himself from this locale. He would not have chosen to travel in a half-grown state, but survival required it. He had to get across the water and away from the shore, and soon. But how?

Any decision he might have made became irrelevant. The crisis was on him even as he balked at the water.

A tremendous quake shook the island, making the ocean dance and the trees splinter and tumble. The ground lifted, dropped, and lifted again, throwing him violently to the side. As he scrambled back from the beach large cracks opened in the ground, grinding against each other noisily and spewing up gravel and mud. The sea pulled back momentarily, as though afraid; then it rushed at the beach in mighty waves, smashing into the rocks and foliage there and foaming well beyond the normal high-tide limit. The water was brown, and where it passed a coating of mud and debris remained.

Then it was very quiet, but Orn knew that the island was doomed. His ancestors had tended to nest in similar places, and had met this situation before, and the warnings in his memory were lucid. He had to flee it, for there was no memory of those who had not done so; none such had become his ancestor.

That memory also guided his course of action. He ran to the single river that wound down from the oldest and largest mountain and gathered token tributaries to itself. There should be trees in it now—floating trunks toppled by the quake and wrestled about by the current. He might board one there, where he could reach it, and ride it into the sea. With that extra mass and buoyancy he might achieve the crossing he

could not hope to accomplish alone.

His trip was wasted. The river had been dammed by a mass of rock, and was already backing up into what would develop into a small lake. There were floating logs—but on the wrong side of that barrier.

Again the ground shook, less violently but more persistently than the last time. Before the vibration subsided there was a subterranean *snap!* followed by a different and, to Orn, more ominous type of rumbling.

Alarmed, he looked up at the tremendous elder mountain. His fear was justified: yellowish gas was rising from its weathered cone. The fire mountains never really died.

Even as he looked, a vent opened in the side of the cone and a monstrous belch of vapor emerged. It formed a bulging cloud, completely opaque, that gathered, swelled, and *rolled* down the incline toward the river. Behind it was conflagration: a swath of blistered rock, shorn of its former veneer of life.

The cloud was large: he could see the top of it even as it dipped into the gully of the river several miles upstream. He heard the hiss of boiling water, and in a moment saw the cloud expand enormously as water vapor distended it.

The mountain trembled again, roused into action by the initial quake and now finished with the preliminaries. From the vent in its side poured a golden syrup, splashing down the smoking channel left by the cloud. Where it spread to touch the fringe of vegetation, flames erupted and smoke gouted up. The lava, like the gas, obliterated everything in its path except the ground itself.

Orn knew about this also. Perhaps the searing molten rock would solidify and stop before reaching the sea; more likely more would come, overriding the first mass as it cooled, until the entire island lay buried

beneath it and all life was gone.

Fire now raged through the forest, charging the air with its odors. Minor tremors continued. Tiny animals fled the forest and milled on the beach, doomed.

Orn waded into the water, knowing he could not afford to wait longer. There was a chance that the ocean predators would be frightened or confused by the shocks, or even stunned, so that he could swim across with no more than the water to contend with. A chance—but he entertained no unrealistic hopes.

The water appeared calm from a distance, but this was illusory. The surface had been churned into ugly foam. Hidden objects banged into his feet and chafed his legs, and the violent currents beneath the froth tugged strenuously at his balance. He flapped his wings, fouling them in the dirty spray, and held his beak high—but for nothing. He was soon swept off his feet and dunked in the grainy liquid.

He swam, using his legs as ballast and rudder while paddling messily with his wings. Aquatic birds had webbed feet, but his own were clawed and virtually useless for propulsion in the water. Everything was wrong, for him; he was poorly structured for swimming and had to hold his head low lest he be overturned entirely. That interfered with visibility. His nictitating membranes protected his eyes from the salt spume, but the constant dousing inhibited his breathing. He was not enjoying himself.

Storm clouds formed overhead and wind whipped savagely across the surface. Orn rode the growing swells, up and down, up and down, fighting for equilibrium and orientation. The gusts of air were warm, not cool, and carried the stifling fumes of the volcano. Substance descended from the storm above—not rain but particles of rock-ash that chipped away at his feathers and smeared his plumage dark. Only his acute

sense of direction kept him facing the invisible mainland.

Then his feet banged into something solid. For a moment he thought he had made it across, but his vector sense reminded him that this was impossible. But he was also far from the island. A sand bar must have developed since the crossings of his ancestors, for there was no hint of shallow water here in his memory. Full grown, the prior crossers had been more powerful swimmers and had made competent surveys of the local geography, and there was a firm image of deep water here. The contours of the land and island had changed, fuzzing their images, but the depth of the water had been stable.

He stood, and the ocean fell away around him while the windborne fragments pelted down. A ridge of land ascended from the waves, mottled with fragments of seaweed.

No—this was no sand bar, though the bottom was not as deep as it had been at one time. Instead, the water was receding, laying bare the ocean floor.

He could walk to the other side. But he realized that the chances for his survival had just dropped again. To the earthquakes and volcanism had been added a third threat.

He trod upon an old-time coral reef, the shells now largely broken and compacted. Great sponges branched out of the crevices, and jellyfish lay sprawled helplessly. Most of the true fish had escaped with the water, but a few were wedged fatally in barnacle-encrusted declivities. Crabs scrambled frantically, their claws become dead weights, and a starfish that had folded about a clam now found itself prey to circumstance.

This was a world less familiar to Orn, and despite the danger—or perhaps because he had given up hope of living when he realized what the dropping of the sea meant—he contemplated it avidly. So many

marine plants he had seldom tasted, even in memory; so many exotic forms of life. Many of them had changed little since his ancestral line left the water; others were quite new. He had so little time to live; he wanted to learn as much as he could before he lost the opportunity forever.

He had been picking his way along, and had made incidental progress toward the shore while he observed all this. Now he began to give way to his reflexes, despite the uselessness of this. Behind him it was coming, as he had known it would: a massive swell of water traveling better than ten times his own maximum running speed. Around his feet the level was rising, seeping in quietly. But the major wave was another matter.

The wave would crush him; there was no way he could get out of its range in time, and had not been since the water dropped. But the blind instinct for survival swept through his body at that sight, and he had to yield to it. He flapped his wings and stretched his neck forward, putting all his strength into the sprint, running over the ragged coral without regard for his feet. He could hear it now, as the giant wave tripped over the shallow island shelf and loomed higher and higher. It had exchanged forward momentum for elevation, but still closed the gap rapidly.

That slowing of pace as it gained height had not been clear in his memory. He had more time than he had supposed, though still not enough. He kept running.

Suddenly the mainland beach was there, and he was scrambling across it. He charged into the brush, leaping over what he could and tunneling through the rest, heedless of the plumage torn out in the process. It was growing dark; the shadow of the wave was enveloping him. The breeze was suddenly chill—and it moved *toward* the water.

Still he ran, over rocks, around trees, up

and away from the shore. He had expected the leaning wall of water to fall on him before this, ending everything, but that doom hovered, hovered.

And fell. It struck so abruptly that he wasn't aware of it until he found himself caught up and hurled forward, completely inundated and helpless. It was as though he were drowning in a fierce ocean current—but as he was whirled about, he saw a landscape in the sky, falling sideways.

Then he was sinking through increasingly tenuous foam, losing support yet not really falling. He flapped his wings and felt froth splashing against them. His rump landed hard, and he clutched at foliage with his beak, afraid of being sucked back out to sea though the alternative was to be dashed against the ground and crushed.

But he had already landed, and was no longer moving. Somehow he had survived the blast, if through no doing of his own.

The water continued to subside, leaving him on a green island. He was dizzy but whole—and on the mainland! He looked about.

He was perched on the stout upper foliage of a broken-topped fir, six times his own height above the ground.

Chapter 4: Veg

THEY WERE in a cavern—and not a natural one. Solid rock had been melted to form an irregular chamber, in whose wall was set the receiving focus. Below that entrance were scattered boxes of supplies, as though they had simply been dumped without supervision.

Just the way the seven of them had been, Veg thought. It was a pretty unimpressive way to begin a mission.

"No receiver, since this is what might be termed a probability shift," Cal observed. He seemed to have worked it all out already. He always knew the score before the game got started. "The effect would resemble that of a spurting firehose: it can affect the volume in front of the nozzle, but not very much behind it. They must have fired a heat-beam through and melted out a cylindrical cavity. Then supplies, never risking any men . . ."

The mantas were already spreading out. One had found a drill-hole projecting straight up, and was shining its eye into it; another poked into a dark horizontal recess.

"But where did all the stone go?" Aquilon asked. "Solid or melted, it can't just disappear."

"Not if they reverse the flow and suck it out through the aperture—or rather, let its own gaseous pressure drive it through. A ticklish operation, but feasible, it would seem."

Veg followed the manta—Hex, he was sure—beyond the tumble of supplies, his flash beam flicking about. A yard-high tube curved away into darkness. "No sense sitting around until our air runs out," he called back.

Aquilon joined him, seeming to agree. They were committed; it was pointless to procrastinate. A new adventure beckoned.

"That would be the corkscrew leading to the surface," Cal said. "The small, vertical shaft would have been intended to provide air, but of course that failed. I imagine they used it to fire up the observation rocket instead, then let it seal over again. There's a fair amount of work ahead before we leave this region."

Veg moved along, knowing Cal was probably right, but disinclined to dawdle while the tunnel lay unexplored. He did not suffer from claustrophobia, but did prefer open range when available. He slung the

flash around his neck and proceeded on hands and knees. He could hear Aquilon following, and wished he had a pretext to glance back at her in that position. She was a well-structured woman.

The passage curved steadily to the left. He soon lost his orientation, retaining only the nebulous impression that he had navigated at least one complete circle. His knees were chafed; there was not room to go on hands and feet. But with Aquilon behind (and not complaining about *her* knees), he could not hesitate. Hex had long since disappeared ahead, managing to travel nicely in the confined tube.

The loops were interminable. The officer, Noodle-brain, had said something about using a borer to cut through the rock, but he hadn't hinted at the distance! Veg was beginning to feel constrained.

At last he came up to Hex, who was humped before a metal barrier. This was a plug that filled the tunnel almost completely, rimmed by a rubberlike flashing that squeezed tight against the circular wall. In the center of the plug was a dial and knob resembling the face of a combination lock. That was all.

"What's the matter, slowpoke?" Aquilon inquired. It meant nothing negative and nothing positive, but he felt a certain happy tension whenever she addressed him, especially with a friendly teasing comment like this.

"Can't get around Hex," he said, straightening so that there was room for her to squirm up beside him. She did, moving lithely—but the process still entailed a certain amount of contortion and physical abrasion. As if anything as rounded and resilient as Aquilon's torso could abrade in any but an esthetic sense. Esthetic? Least of all that!

"That's not Hex," she said. "That's Circe."

What a woman she was! Since he had met her, he had lost interest in the fleshy shells that masqueraded as human femininity. He had not realized how deeply Aquilon affected him until they had parted, after Nacre. On Nacre, home planet of the mantas, he had bantered with her in the midst of mystery and danger, thinking it no more than a passing fancy; but back on Earth when the trio split up in order to protect the growing mantas—

"Wake up, vegetable," she said, snapping her fingers under his nose. Even those were slender and shapely. "I said you had the wrong manta."

"You're crazy," he mumbled, embarrassed at the chain of thought her nearness had started. Yet what other thoughts were possible when she was this close?

"And you claimed you knew your own manta!" She dismissed the matter as though it were settled (as probably it was; he hadn't identified the manta that surely) and peered ahead. "Must be an airlock." Her lovely face with its tangled blonde hair was so close to his that her sweet breath caressed his cheek. The skin stretched over the delicate curve of her chin, close enough to kiss. She lay on her left side, he on his right.

Dolt that he was, he hadn't realized how strongly he felt about her until that government agent, Subble, had tricked him into the admission, after beating him in fair fight . . .

"There must be some way to open it," she continued, oblivious to his turbulent yearnings. "Is that a combination lock?"

"Maybe." There had been no element of flirtation in her contact. She was unaware of the electrifying effect of a perfect breast as it touched a man, even sheathed as hers was by layers of clothing. Once it had seemed that she returned his developing interest, but obviously that had passed. She did not

need to say a thing; her indifference to his maleness was manifest in so many little ways. He was a friend, not a man-friend.

"Let me try it." She brought her right arm up, threading it between them, and reached for the dial. As she twisted, he was treated to a scenic view of her right breast flexing under the coverall in response to the motion of her arm.

A woman with a mind, yes. But not one of the board-busted genius-types, no. He had regarded the gender with a certain veiled contempt in earlier years, to be appreciated in purely physical fashion—until he discovered in Aquilon what a woman could be. A *complete* woman. She had said she did not eat meat any more . . .

Yet of course he had little to offer a real woman. He appreciated intellect without being intellectual himself, much as a working man appreciated wealth without possessing it. And no windfall income could rectify *that*.

There was a click, and Circe moved aside somewhat. "I've got it," Aquilon exclaimed. "It's not really a combination, just a kind of safety-catch. I'll have it open in a moment."

Her eyes, as she peered up, were gray-blue; her lips, as she talked, compelling. "Moment," she had said—that word like two kisses strung together.

"Careful." It was Cal, behind them, startling them both. "Remember, we're under water."

Aquilon's hand froze on the knob. "Water!" she exclaimed, as though she hadn't known.

"That's right, I forgot!" Veg said, taken aback. He imagined a torrent of salty liquid smashing in, washing them down the tube as though it were a drainpipe, swirling them in amongst the boxes of supplies like so many drowned rats. What would they do without Cal's innate caution?

"That would be the borer," Cal said,

shining his own light between them. Grotesque shadows blotted out most of the beam. "Probably it is water-tight, and of course we'll use it as an exit-lock, once we have our diving suits on. But it would be wise to verify—"

"The borer?" Aquilon asked.

"My dear, I fear you were not paying proper attention to that attendant's lecture," Cal said reprovingly, and her fair skin colored slightly in the angled beam. Veg saw it then: if she had real interest in either man, it was Cal. Cal with his brain. That was the trouble. A woman without a mind looked for a strong man or a handsome one; a woman *with* a mind looked for an intelligent man. The kind of woman Veg could appreciate was also the kind who would naturally prefer Cal. Cal was only small and weak when you looked at him, never when you listened to him.

The borer, as Cal explained for Aquilon's benefit (and for Veg's too—he had not paid proper attention to noodle-brain's lecture either), was a tractorlike device with a diamond-surfaced bit that ground into rock and pulverized it. The dust and chunks were blown back down through the tube for disposal. In this instance the borer had been stopped the moment its nose projected into the water, so as not to flood the passage. It could be entered by reopening the sealed exhaust-section, and also by the service gate set into its side. The dial in its rear would indicate internal pressure, and the proper setting would activate the water pump and evacuate the interior as required.

In the end Veg had to back away so Cal could pass him and Aquilon and Circe and come up to manipulate the control. Veg felt as though he had been demoted—but it was good that *someone* here knew what he was doing! The thought of all that sea-water pouring in—

"Clear," Cal announced. He clicked the

dial. "Should come open now—"

It didn't. Cal manipulated the knob again, puzzled, but still nothing happened.

"Must be jammed," Veg said. "Want me to—?"

"There's no handhold," Aquilon pointed out. "No way to yank. Unless the dial can be—"

She was right. He remembered the featureless wall of metal. And obviously it would be unwise to tug too hard at the knob. He pictured delicate wiring tearing, tumblers jamming, so that the group was sealed in permanently behind a ruined mechanism. A fine report to take back to Earth: "Sorry—the door was stuck!"

But if the connection to Earth was out of phase, or whatever that problem was, they could stay cooped up in the worm-bore for weeks or months. How much canned air did they have?

"I'm afraid Veg is right," Cal said after another fruitless minute. "It is jammed. It should open but it doesn't."

"We could try it again in a few hours," Aquilon said without enthusiasm.

"And let it rust even worse?" Veg demanded. He put one large hand on Aquilon's slim ankle and tugged gently. "Back off, both of you. And Circe too. I'll get it open!"

The others allowed themselves to be bullied away from the barrier, and Veg came up. Circe retreated a little, so that he had an entire segment of the tunnel to himself. He braced, brought back his arm, and slammed his fist sidewise into the panel beside the dial.

It was that simple. The metal gave. Opposite the dial a semicircular section swung out, spraying flecks of dirt into his face, and cold water gushed forth.

"Oops!" Aquilon exclaimed as she got soaked.

But it was only the token backlash of

inanimate perversity. Veg had won the round and the way was open. He blinked his eyes clear and caught the panel. It rotated around a vertical column, the dial set in its center, leaving a vent about a foot wide on either side. Wires trailed from the backside into the body of the borer.

"I must admit you have your uses," Cal said, coming up. "Now this should slide out—"

The borer chamber was about eight feet long, with a bank of dials on the far wall. Beyond it, Cal explained, was the motor, and beyond that the drill itself—now projecting harmlessly into the water. Along the sides of the compartment were indentations for the caterpillar housings, making the available space quite narrow.

"We'll have to haul our supplies to this point, then ferry them through the lock," Cal said. "The outside man will have to wear a diving suit. According to soundings and the record of the photographic roeket, we're only two hundred feet below the surface of the water, so it shouldn't be too difficult. Still, it might be wise to climb to the top and take a sighting, before we commit ourselves too far."

"Climb?" Aquilon inquired from behind the manta. "Don't you mean *swim* to the top?"

"Swimming would be risky until we know more about the local currents," Cal explained. "And the suits are weighted. We'll send up a balloon and climb the ladder that anchors it to the borer. If we spot land, we'll *walk* to it—across the bottom."

Aquilon was silent, and Veg appreciated the reason. On Nacre, Cal had been near death, and the other two had assumed the leadership and organized the trek from the wreck of their vehicle back to the camp. Now Cal was healthy, and it was evident that he was the natural leader of this trio. It

simply took some getting used to.

There was a winch in the borer, powered electrically with cartridge capacitors. They removed it and got organized on an assembly-line basis. Cal connected the line to objects in the proper sequence, Aquilon ran the winch from a location just below the borer, and Veg was outside man. The line was actually doubled, passing through a pulley at the base of the tunnel so that it was not necessary to reset it by hand after each haul. But because of the narrowness and curvature of the passage, they had decided to run only one load at a time; a break or jam would be awkward to fix otherwise.

The diving suit was rather like a space suit, but built to resist pressure at key points rather than to contain it. It was quite heavy. He got it on, then had to squeeze himself into an uncomfortable knot inside the borer and push closed the panel. It sealed into place as Aquilon worked the knob control. Then water began to flow in through a vent in the floor. It entered with some force, splashing against him and collecting in a puddle beneath, as though he were lying in a filling bathtub. As the water rose up around his faceplate he began to feel that claustrophobia he thought he didn't suffer from. He knew he couldn't drown in the sealed suit, but the suggestion was powerful. He couldn't move, he couldn't escape; he had to lie here and let the liquid claim him! One leak . . .

Once the chamber was full the effect vanished. It was the sight of the advancing waterline that did it, he decided. Now he was floating and felt comfortable.

He tried the side-port. At first it wouldn't open, and he realized that the pressure hadn't equalized yet. He tried again after a short wait, and it yielded readily. It swung out, a blister of metal, and he peered into the darkness beyond.

He activated the suit's helmet-light and

looked again. The beam struck through cloudy water and faded in the distance. Like foggy Nacre, he thought; and this must be what the manta's vision was like: just a tunnel of light in the opacity. A manta could not see anything that wasn't directly in front of its eye.

He pried himself out of the borer, feeling like oldtime toothpaste inching from the tube. The borer-manufacturer had not had a man of his dimensions in mind!

At last he stood beside the borer. The suit seemed light now, and he was glad for the weights that kept him gently anchored. He knew that without that ballast he would be borne helplessly to the surface by the buoyancy of the air encasing him in the suit. And without that shield of air he would be pretty cold in this water, not to mention squashed and suffocated. He had to admit that things had been pretty well planned.

He looked about. Cal had been right about the position of the borer: its gleaming blades projected into the water, reflecting the beam of his helmet in a spray of light. How much diamond had gone to coat that massive screw?

Beyond the borer was the floor of the ocean. He was surprised to discover that it was not level here, but hilly; somehow he had visualized the depths as similar to the surface—flat with small waves. The borer projected from a steeply slanting face of rock. Had the slant been the other way, the machine would have had to grind a long way farther before emerging. He saw some small fish, but could not identify their type; certainly they were not like the ones he knew. All in all, the unfamiliar detail made him uneasy; he expected oddities on some far planet, but here in the water he had no proper emotional framework.

He was startled by a knocking from within the borer. Three taps: their joint human/manta code for Question. Aquilon

wanted to know how he was doing.

He tapped back once, affirmatively, and pushed closed the port. He heard the click as it locked in place. The evacuation pump started up, and he saw the seaweed-like growths wave as the water was spouted out of the bottom aperture.

In a few minutes bubbles emerged, the current stopped, and assorted rumblings emanated from the interior of the unit. Then there came a banging, not a signal; Aquilon was pounding on the panel, trying to open it.

In a sudden mental illumination he understood the problem: the air forced into the chamber to evacuate the sea water had to be under high pressure. Once the water was out, that pressure remained; it had nowhere to go. And the bulkhead to the tunnel was designed to open only when the pressures were equalized, in and out, to prevent leakage.

There should be a valve to release the surplus pressure within the chamber, once the water was out. Probably it had gotten plugged. He had pounded open the panel by sheer force, but Aquilon did not have his strength.

Here he was with both the muscle and the insight—where neither could be applied to the problem. How were they going to get the supplies through?

A large, sleek fish nosed up to him. Veg cast about for some weapon, but had none. Anyway, he had no idea whether this creature was dangerous. It must weigh more than he did—or *would* weigh more, out of the water. What would he do if it attacked?

It did not attack. It merely continued to snuff him and the borer as though curious. He wished he could identify it, in case it were a shark. But he didn't want to be on the defensive if it turned out to be some entirely innocuous or even friendly prowler.

There was a deeper *thunk!* and under his

hand the metal shook. The fish jerked back, alarmed. What had happened? He tried to pry open the port, but it was tight, as of course it would be. Whatever had happened inside—had happened. There was nothing he could do.

"What's your opinion, Sam?" he asked the fish. He doubted that any sound left his helmet, however.

Then bubbles shot up from the top pipe, and he knew that it was all right. The water cycle was starting over.

This was too much for Sam, however. The big fish coursed away into the obscurity of the surrounding ocean.

Before long the bubbles stopped. He tried the port again, and it opened. He aimed his light within. There was a cylinder, a roll of nylon cord-ladder, and a balled balloon. He took them out, wondering how Aquilon had gotten around the pressure problem.

He tied one end of the cord to the borer, looping it around just below the bubble-chimney. He threaded the other end through a gross needle-eye in the base of the balloon and knotted it tight. Finally he hooked the nozzle of the tank into the balloon and fastened it in place. He turned the tank's cock.

Helium gas whistled coldly into the balloon. The ball unrolled as though it were a Halloween toy and inflated into a yard-long tongue, then became a long gourd, then a watermelon. It began to lift the tank, hauling up on the nozzle.

Hastily Veg flung another loop of the ladder around the borer and clung to it. The balloon dragged the tank up to the limit of its play, twelve feet above the borer, and held it there.

Stupid! He had forgotten that the thing would rise as soon as it was inflated, and he had made no preparations. As though a ball of helium, light enough to lift a dirigible in air, would sit still under water . . .

Expansion leveled off when the balloon was about a yard in diameter. Veg climbed up the ladder, now taut, and tied off the sphere, letting the tank drift down. He watched the flow of bubbles from the borer's chimney go by within a foot of him. Then he descended to the floor and wrestled with the segment of ladder he had tied to the borer. It was too rigid to move.

Meanwhile the next cycle had been completed. He gave up on the ladder and opened the port.

A-head poked out, followed by a body that was feminine even through the crude folds of the suit. Aquilon had joined him.

She glanced around, shining her headlight, entranced as he had been by the scene. Then she saw the tangled ladder.

She could have spoken to him by touching her helmet to his—or maybe even directly through the water, since this was *not* a vacuum between them—but did not, to his relief. His stupidity was obvious. He'd had no idea the pull would be so strong with such a small balloon.

Together they worked the ladder over the body of the borer, seeking to pass it off the end. Suddenly Aquilon stopped, pointing to the diamond-edged drill. Of course! Friction against that could sever the rope, or at least damage it and make it unsafe.

Aquilon tried another ploy. She picked up the slack length of the ladder between the first and second loops and began pushing it under the borer. Veg saw what she was doing and assisted. The idea was to carry the slack around the borer, so that the second loop would in effect be brought adjacent to the first, allowing all the intervening ladder to ascend to the surface. The cord was very fine, and there appeared to be well over two hundred feet of it—more than enough.

They bunched it up and shoved—and abruptly the whole length of it was rasping

through, and the balloon was rising out of sight. They stood back and watched it. Veg appreciated how narrowly they had missed making another mistake: had a hand been caught when the rope let go—

The motion stopped, and there was slack at last in the main line. Quickly they re-anchored it so that the ladder was vertical and firm; then Veg began to climb. Belatedly he realized that he could have had a free ride up, had he clung to a rising rung. Now he had the easy but tedious job of mounting it step by step.

By step. He lost count of the rungs somewhere between sixty and eighty, not certain whether he had skipped seventy or repeated it. The water around him was featureless; even Sam the fish would have been welcome company. Was he really ascending, or just working a treadmill through nothing?

At last he reached the top. The balloon floated amid a choppy sea, and white clouds decorated the blue sky spreading overhead.

He looked out over the waves, standing with his feet hooked into the top rung of the ladder and his arm about the bobbing balloon. He saw—more waves.

He craned his head about.

Behind him, perhaps within a mile, perhaps much less, was a mountain.

Veg smiled, let go the balloon, and drifted down toward the floor of the ocean, mission accomplished.

Chapter 5: Orn

IT WAS a strange world he ranged. The familiar palms and cycads were rare, their places taken by burgeoning flat-leaved, flowering trees and bushes. He knew these newer plants, but here they were in

unprecedented profusion, dominating the landscape rather than occupying their occasional nooks, and that was hard to accept readily. His reflexes were wrong for this, his expectations constantly in error, and that upset him. The mighty firs still stood in thick forests—but these forests were smaller than they had been. Ferns were still common, but stunted; if their form was little changed from those of his twenty-million year memory, this was small comfort.

Orn did not speculate on the meaning of these changes. He was concerned with what had been and what existed now, not with what it might portend. Every object he saw evoked its peculiar history, clear with the vision of countless generations of his observant forebears. Change was in fact uncomfortable for him—but he had been forced by his orphan status and the pressure of invincible events to adapt more readily than had his ancestors. Perhaps his very isolation had facilitated his survival, for had he been trained in the usual fashion by careful parents he might not have had the initiative to escape the island when that became necessary.

He was familiar with the mainland as it had existed many millions of years before, and was hungry for fresh information. But this normally would have meant slight changes in geography, flora and fauna, instead of the catastrophic alterations in all three he actually discovered. These flowering plants—never had anything leaped into prominence so explosively before.

Orn was hungry physically, too. His appetite was unspecialized, omnivorous. Leaves, fruits, mams, arths, occasional gulps of water, pebbles to aid digestion—whatever had food value could be his meal, provided it was not poisonous. But he lacked the imagination to search

actively for specific meals. He ate whatever was available.

He scratched away the dried, mottled leaves beneath his feet. His two front toes had long sharp claws, while the rear toes that bore much of his weight were stubby and solid, the claws more like hoofs.

Yes—the little arths were there, just as they had been on the island. The land had changed, the soil had not. Some flying aves fed exclusively on the tasty arths, and so could he if he could only find enough. But these vanished even as he uncovered them. He required more substantial food for his travels. And he had to travel, for he knew that the lull in the volcanic activity was temporary.

Orn's beak was not adapted to snare the fast scrambling creatures, but he scratched again and ran out the sticky tip of his tongue to spear several before they found cover. They were delicious as they passed into his crop—but such a meager repast only intensified his hunger.

He straightened up, casting about for prey that would satisfy him for many hours. Hunting was difficult in this unfamiliar territory. He listened.

From far above came the cry of one of his primitive cousins, a flying bird. Orn looked up and saw it swoop over the trees, searching out the flying arths. He flapped his wings experimentally, momentarily wishing he could do likewise. Many hundreds of lines rode the air now, more than ever before. But this had been impossible for his own line for so long that he had only the dimmest specific memories of flying. His wings were mainly for display and defense now; the weight of his large head, with its burden of memories, prevented him from even jumping high, let alone flying.

Another, gentler sound came to him. It was the trickle of water over naked stone. A

stream!

Orn found it immediately. He stood at its brink and studied the narrow channels as the bright liquid coursed between the rocks, then plunged his beak into it and drank. Unlike his cousins, he was able to suck in water without lifting his head to swallow. But he did not need the voluminous quantities that poured through the little systems of the mams. *They* survived by tanking up sufficient liquid to last them for a reasonable period in spite of copious urination; *he* survived by being efficient. That was one reason his line was superior to theirs, apart from the factor of memory.

Small fish flashed by, reminding him fleetingly of the swimming stage of his ancestral line. The notion of feeding on creatures like those he had derived from did not disturb him; in fact, he rather appreciated the connection. He stalked upstream in quest of a pool that might contain fish large enough to be worthwhile.

Something moved nearby. Orn swiveled his neck to fix one eye on it, and spied the disappearing tail of a good-sized snake. This line of reps had recently dispensed with legs and become slithering creatures. He had eaten a few on the island, but this one was fatter and longer. He pounced on it, pinning its head with one foot while his beak cut through the neck.

The raw segments of it were cool and juicy and delightful as they collected inside him, assuaging his hunger.

Highlands existed where he remembered swamps, and the drainage of the landscape had changed. The nights inland were cool, the days hot. Orn, in the days of travel away from the treacherous volcanoes, was finally able to set aside his expectations and accept what he found, and his emotional distress diminished.

Birds were everywhere, none' intelligent

but in other respects more advanced than those of his memory. They swooped cleverly through the air and swam in the small, cold ponds. The families of the arths were fabulously abundant. And the little warm hairy juicy mams had emerged from their tunnels and hideaways to tread boldly in the open, overrunning forest and glade.

Orn found a number of the mams easy prey. The largest were hardly a danger to him, and most were so small he could swallow them in a few bites, wasting only a few hot drops of their substance. It was not that they were not cautious, but that the larger ones did not seem to expect trouble from a bird. This allowed him to get quite close before they took proper alarm and a quick neat pounce usually brought him a pleasant meal. The mams learned quickly, however, and he found them to be much more wary of him after one or two of their number had been taken from any particular assemblage. But since he was traveling, this hardly interfered. He had never eaten better.

He continued to feel a vague disturbance, however. Something was missing—but he could not identify it until such time as he actually saw it. He knew that life was too easy for him here; that there should be more danger. But again—he had to experience that danger to identify it. His memory was very long, but also very selective.

Gradually he overcame the difficulty he had initially to appreciate the new forms of animal. Had his ancestors watched these creatures evolve for a thousand thousand generations, the picture would have been strong. A million consecutive lives, each life a single, momentary picture—the whole making a composite creature. But this single flash was too brief for him to assimilate properly, even though it occurred in the present and consisted of many hours and days. His ancestors had been confined

beyond the rising mountains recently, making too few forays through the changing passes and over the moving continent to form the necessary pictures of the fast-changing animals.

But some few lines were clear. The cautious marsus were little changed. The plant-feeding multis were more difficult, for they were larger and more diverse now, making a jump in the memory pattern. Some he had come to know on the island, and that helped him make the adjustment. But the arth-eaters had diverged prodigiously, feeding on the vast numbers the flowering plants supported. Now there were many major lines, few of which retained their original nature—and these creatures with small parts were largely invisible to him.

This was dangerous, as he realized almost too late.

The thing was coming at him before he comprehended its menace—much as he had come at careless small prey. This was a mam, but almost as massive as himself, and far more ferocious than he had come to expect. Vaguely he fathomed its ancestry: one of the lines of tiny tree-dwelling insectivores that expanded their scope to feed as well on nuts and carrion, quivering as the tread of giant reps shook the ground. Somehow these unprepossessing midgets had descended to take over the reps' terrain, and now were becoming large and bold themselves.

For a moment Orn seemed to grasp what had bothered him most about this land, but he was allowed no time to fix on it. The adjustment to the present creature was too rapid. He did not have its entirety in mind, and so did not know how to handle it. Rapid thinking was not his forte; he depended on the reflexes engendered by millions of years of experience. Given time, he could adapt to this situation, though with difficulty—but

the animal was attacking *now*.

Its tiny claws of Orn's memory had become talons worthy of an ave; its teeth, though small, were thick and sharp. It moved with a sinuous grace almost like that of a snake, yet it carried its bulk on four muscular legs, and was capable of alarming speed.

A killer mam.

He countered as it pounced. He spread his wings, squawked, and jumped to the side, stabbing forward with his beak. His pattern was clumsy because of the oddity of the creature; had it been a rep of similar size he would have scored upon an eye socket. But his action caused it to sheer off, and he had a momentary respite while it slowed, turned, and came back.

Classify it as a new creature, Orn decided. Once it had been an insectivore, but now it was a carnivore, a *creo*. Its legs were springy, its snout blunt, and it used its feet for fighting as well as its teeth. It was as alert and swift as Orn himself—not astonishing in a warm-bodied mam, but horrifying considering its grotesque size.

If only he could *see* it! But his ancestral images simply did not match the immediacy; his memories were too far out of phase to be meaningful at once. He had to guess at much of the *creo*'s nature, and he was not good at such extrapolation.

Had the mam been familiar, he should have been able to defeat it in combat. He was, after all, Orn. But as it was, he would be its meal.

It sprang. Inspired in an uncharacteristic fashion, Orn visualized it as a running rep of similar mass, and reacted accordingly. He brought up one foot, spread his wings for balance, and struck for the tender nostril.

His blow missed, since this *creo* was faster than a rep and had a shorter snout. But his talon caught it in the neck and raked a bloody furrow across its hairy

hide—something the scales of the rep would have prevented. He followed up with another beak-stab at its eye, and scored on its pointed, flabby ear.

The *creo* howled and snapped sidewise, but Orn was out of its reach already. He brought his foot up again, and this time caught it in the muscular jaw with the downstroke. Flesh tore from its cheek as his claw carried through; blood and hot saliva sprayed out. Again it snapped sidewise, toward the injury—and because that was exactly what a rep would have done, Orn was prepared once more. His beak speared its eyeball and penetrated its brain, and it was abruptly dead.

Again Orn struck, reacting to the greater life-tenacity of the rep, and had its belly torn open before he realized that it wasn't fighting any more.

He stood back then and gazed at it, knowing that he had been fortunate to survive. Had he not summoned an image that enabled him to fight *something* efficiently, *creo* would now be looking down at Orn's own corpse.

But he did not waste undue time in contemplation. He finished the work of dissection, studying each soft organ as he consumed it, and when his crop was full he had some better understanding of this mam. Should he have to fight another, he would be better prepared. But he would not battle another voluntarily! Not this agile, clawed, toothed monster! Better to avoid *creo*, and all large mams.

But it did make an excellent meal!

Chapter 6: Cal

CAL LAY in the bore-hole, his light off, just below the winch. Circe stood above it.

He doubted that the mantas had anything resembling human sentiments, and certainly they were sexless. But it did seem that Circe was female, and that she looked out for Aquilon's interests. The other mantas remained below, taking no part in the human activity, sitting beside the supplies like so many toadstools. Circe had stayed with Aquilon throughout, the only one never to leave her, and there was now a certain flavor of Aquilon about this manta. Perhaps some manta lottery had decided which one would associate with which human—but Cal suspected something more than that.

It was too easy to personify all the mantas. Actually they were alien; man was far more closely related to the birds, snakes or spiders than to these third-kingdom sentients of Nacre. On that far planet a germ plasm of something akin to slime mold had evolved into complex, motile forms, superseding the entire animal kingdom. The internal chemistry of the Nacre creatures remained largely a matter of conjecture, since their bodily energies came from breaking down organic substances, not building them up. The mantas were the pinnacle of fungoid evolution in much the way man was the end result of animal evolution on Earth—so far. The astonishing thing was how closely the two species resembled each other in areas that counted. Man had two eyes; the manta had one. Man had a powerful brain; the manta had a lesser brain, but was able to communicate more effectively. Man was omnivorous, the manta carnivorous, in relation to its framework. Strictly speaking, all the creatures of Nacre had been herbivorous until man arrived there, since there had been no animal kingdom to prey on.

But these were picayune distinctions. Converging evolution had brought the two species to the point where they had more in

common with each other than with a number of the variants of their own lines. It was as though nature had intended them to meet and coexist.

But why had those three mantas made their suicidal dash for freedom? They must have understood a good part of the official's presentation, and so been aware that no harm would come to them, even though they were not to be returned to Nacre.

Not to be returned to Nacre.

He lay there, chagrined at his own obtusity. Of course the manta would rebel at such a sentence of exile! The human trio had not been happy on Earth, crowded and sick as mankind was; how could they have supposed the mantas would like it any better? Sparsely settled Nacre was the best place for the mantas. They must have eagerly awaited the chance to go home, after learning the ways of man and establishing a line of communication. To have had that expectation, that dream, so rudely cancelled . . .

But only three had bolted.

"Circe," he said.

The manta made a tail-snap noise in the darkness: YES. It seemed strange to speak and have her respond, when he knew she heard with her eye. But the darkness was to his eyes only; the mantas generated their own illumination in the ultraviolet range, so were independent of outside sources. Circe could see his speech.

"Did you seven agree that three of your number would make the break?"

Three snaps: QUESTION.

He had phrased it in too complicated a fashion. He tried again: "Lin, Tri, Oct—you knew?"

One snap: YES.

So it had been planned. The mantas had had ample opportunity to work out a detailed plan of attack, since the full power of each mind was channeled through the

single eye. A man might require a full hour to convey a single nuance of feeling, and even then not succeed; but the mantas could project it all in a fraction of a second. They were not more intelligent than man, merely more efficient.

"You—sent them?" He had to keep it simple. Perhaps the manta vocabulary was still small. Perhaps they did not ordinarily think in word-forms. He suspected, however, that the manta's capability in theoretical matters was considerably smaller than man's. The same efficiency that promoted communication also militated against high intelligence. Man's brain had not evolved appreciably since he achieved competent verbal communication—i.e., language—because there had no longer been a competitive advantage in higher intelligence. He had risen above the hurdle that isolated him socially, and so achieved the stability of water flowing over a dam. Barriers were necessary to progress; neither water nor brain capacity rose without compulsion. That was the way of nature, a mere permutation of physics. The ant had remained virtually unchanged for millions of years, once it achieved a satisfactory social organization; it did not need size or intelligence, so had not achieved them. Man did not need *more* size or intelligence than he had. Why should the manta differ in this respect?

Circe had answered with another snap. Yes, three had been selected to make the attempt, while four played it safe. It did make sense, tactically.

"Who died?"

Three snaps, followed by eight. So *two* had died: Tri and Oct. Cal wondered how Circe knew. Had the spores of the decedents already circulated through the station before the others left?

That was another thing about the mantas. They reproduced by spores, and the spores

were released only at death. Microscopic in size, those spores could be filtered out of the air only with difficulty. Now two sets of them suffused the station. That meant that individual male and female spores could mate with their opposite numbers, to develop with luck into new mantas. Provided they found omnivores to ride on . . .

There was going to be real trouble aboard that station! Cal could not evoke much regret; his sympathy was with the mantas. But it would not be wise to count on much assistance from the station soon. The personnel would be very busy at first, very angry later.

"Lin escaped?"

YES.

So Lin would, circumstance permitting, go free. Perhaps he would actually manage to hitchhike back to Nacre and report to the manta society there. That would probably mean even more serious trouble for Earth. After all, the visiting mantas had seen the planet in all its squalor and savagery, and mantas had died. But he couldn't help hoping that Lin made it. In many respects the manta society was admirable compared to that of Earth.

There was a *thunk!* from outside, transmitted through the layers of metal. That would be the outer port closing. Aquilon was coming back.

He turned on the light and watched the panel, though he knew it would be a few minutes before the evacuation cycle finished. Aquilon affected him that way, making him yearn to catch the earliest possible glimpse of her. She was such a lovely creature, the first woman who had ever treated him as a man, and he loved her. While not brilliant, she possessed more than the average sensitivity. This showed in her artwork. Perhaps it was her painting that he loved, rather than herself. Certainly she was

not for him physically—he knew that, whether she was aware of it or not. The physical, the sexual—he lacked the capacity and the desire, largely. Oh, there were times . . . but it was the intellectual that intrigued him, and he was attracted less to Aquilon's comely physique than to her female mystique.

Still, he liked to look at her.

The dial showed the completion of the cycle. "Go to it, Circe," he said.

The manta leaped and bounced off the panel. The impact of the single foot jarred it open. Air exploded into the tunnel, creating a kind of shock wave but not hurting anything. They would have to do something about that inoperative pressure-equalization valve; this was a cumbersome way to open the chamber.

Aquilon crawled in, unfastening her helmet as she came toward him. "There's land!" she said, her beautiful face alight. "Veg climbed up and saw it. An island, we think—but within a mile."

"Good," he said, feeling enormous relief. He had not realized until this moment how important that was to him. Land, even an island, meant that they could be independent, at least to some extent, of the tunnel and its supplies. Independent of Earth. They could not suddenly be recalled by angry station personnel, or wiped out by a heat beam fired through the aperture. And the mantas would be safe.

The map he had had Aquilon sketch had not been detailed enough to show the configuration of land and water within a hundred miles of the aperture, so the issue had been in doubt. If the significance of that map dawned too soon upon the military organizers of this expedition, there would also be trouble. It tied in, in fact, with the ramifications of the mantas' violence at the station. He and Veg and Aquilon and the four mantas particularly were in dire

peril—until they got far away from here.

Aquilon completed the removal of her suit, folding it carefully and placing the bulky, weighted wad beside the winch. Her coverall clung to her economically; she was sleek and strong. "We might as well move out what we'll need, for now," she said. "I'd like to spend the day on land."

Yes—she understood, at least intuitively, the need for a prompt exodus. Wordlessly he crawled down the worm-bore, so that he could hook up the next box.

It was an island, swept by steady west winds. A small beach well-laden with shells gave way to an interior spread of massed palmetto. A number of off-brown birds nested in that tangle, feeding on the surrounding insects and sea-life of the beach. Cal watched them, but was unable to identify their specific species. They had beaks and feathers and birdlike ways, but matched no genus of his experience. Most were not really good flyers; they were too heavy for their size, and had to rest often. He wondered how they had reached this island. Stormblown, perhaps—and then could not escape it.

The insects and arachnids, on the other hand, were familiar. Flies buzzed about the foliage and inspected the human visitors hungrily. Some were mosquitolike, some wasplike. A drab butterfly skirted his display and moved on. A black armored beetle mounted a spire of driftwood. In the trees he had spotted the trailing lines of spiders, too. Liquid repellent discouraged most of the biters, however.

Crabs and snails occupied the salty perimeter, and schools of small fish traversed the shallows. Both air and sea were warm and clean. Cal was invigorated by the surf as he waded in and bent to pick up an assortment of shells. There was something about the smell of the sea . . .

In due course he had a basketful of hardware. He brought it to the beach, cleared off a section of sand, and arranged the shells in neat columns by type. Some were flat, some spiral; some drab, others ornate. He turned each over, contemplating it, and bit by bit an incredulous excitement grew in him. First the hint of the map, now this confirmation . . .

He thought for a moment, his heart beating with unaccustomed vigor. Then he proceeded to the supply depot they had set up near the brush and picked up his voicetyper. He selected a shell and began dictating.

Cal laid out his last shell and spoke into his typer: "Phylum Mollusca, Class Pelecypoda, Order Taxodonta, Suborder Arcacea, Family—forget it, I'll have to look it up. Call it an Arca, two inch diameter, mint condition." He smiled privately and paused to review his display affectionately: a score of clam shells. Taxodonts, with their small numerous hinge teeth; a number of Dysodonts, like assorted scallops; burrowing Desmodonts; a single weird Pachyodont; several unclassified. These shells offered only a rough guide to this world, since the Pelecypods as a class had diversified early and evolved thereafter quite conservatively. In four hundred million years of Earth's history there had been only nominal modifications of most orders.

He moved a few paces to the gastropod display. Here there was much greater variety, for the shells were coiled, ridged and spired diversely, and several were very pretty. But these too were not definitive for his purpose.

It was, in fact, mainly what was missing that fascinated him. There were very few cephalopods. He had searched diligently and come up with only two shells, both

belemnites. That was highly significant, for the cephalopods had dominated the seas of Earth for three hundred million years before suffering certain selective but drastic extinctions. The belemnites had given way to their squidlike cousins—but the geological period in which belemnites had existed in the *absence* of ammonites was restricted.

The picture described by his carefully ordered collection of shells was remarkable. He was not properly versed, without his reference texts, in every detail of invertebrate fossiligraphy; but he was certain that coincidence did not stretch this far. The fauna of the shallows here matched those of Earth, order for order and probably species for species. Not contemporary Earth, no. Not truly ancient Earth, either. But definitely Earth.

In fact, the evidence of the sea shells reinforced that of Aquilon's map in exactly the way he had incredulously anticipated. He had recognized its configuration without daring to believe it, and suppressed his burgeoning excitement. The Earth authorities, unused to paleogeographical perspective, had apparently missed its significance. Now he looked at shells that suggested either a preposterous coincidence of convergent evolution, or—

Or they stood upon an island in the oceans of an Earth of sixty-five million years past. No—not an Earth—

The Earth.

Aquilon walked up the beach, resplendent in a one-piece bathing suit. It covered more of her flesh than certain contemporary fashions would have, on or off the beach; but she was perfect in it, a strikingly handsome specimen of distaff man. Her hair in the sun was almost white, in contrast with the black of the suit, while her skin already showed an enhancing tan.

"Have to come in before I burn," she said, joining him in the shade of the display tent. "And I'd better catch up on illustration, too." She brought out her brush—somehow she was never without it—and began sketching the shells of the display.

Nostalgia struck him. The last time he had seen her painting was on Nacre . . . how much had transpired since then! Yet she was lovelier than ever. He had longed for no more than this: to be beside her, in a wilderness, watching her paint.

Should he tell her what he had discovered? No—not right away. It would only disturb her unnecessarily. Time travel, after all . . .

"This is Earth, isn't it," she said calmly as she sketched.

"Yes." So much for feminine histrionics. Would he ever fully understand this woman? "How did you know?"

"Your silence, mostly. You should have been exclaiming over divergencies and parallels, since this is by any reckoning a sharply Earthlike world. If it were a true parallel, it would be contemporary, and even I can tell it isn't. And you knew something when you had me sketch the map—yet you never spoke of it again. When I thought about it, I realized that there was a certain familiarity about that map, as though it were a gross distortion of the geography we have today. Earth might once have looked like that, millions of years ago—and you would be the first to spot it. But you shut up—and you're wound up like one of these shells."

Had he shown his tension so obviously? "You've been apprenticed to an agent, I suspect."

She did not reply. Low blow, he realized then. The agent Subble had made an impression on her, how much of one he was only gradually coming to appreciate. Best to

move off that topic. "Does Veg know?" he inquired.

"Maybe. It doesn't matter much to him, though. When is this—the Permian?"

"Off by two hundred million years, 'Quilon. It's the Paleocene."

"The Paleocene," she mused, placing it. "Dawn of the age of mammals, if my girlhood schooling does not betray my aging memory. Vice versa, I mean. I think we should have been safer in the Permian, though."

"Oh, there are few dangerous landbound forms in this epoch. With the reptiles decimated—"

"Safer from paradox, I meant."

There was that. Could their actions here affect the evolution of man? It seemed incredible, yet—

"What are these?" she inquired, her brush moving and rendering as of its own volition. Shape, shade and color were artistically duplicated, the pigments flowing from the brush without dipping, without rinsing.

It was an abrupt change of subject, but he accepted the shift with relief. "Phylum Mollusca—or as Veg would say, shellfish."

"You underestimate him, difficult as that is to do at times. He calls them clams and conks."

"He's right. The hinged shells are Pelecypods, commonly known as clams. Most of the others are Gastropods—Greek *gaster*, meaning stomach, and *pous*, foot. This army really does march on its stomach—"

"Like the manta," she said.

Cal paused, surprised. "Yes indeed. Strange that that similarity hadn't occurred to me."

"But the mantas don't carry their houses on their backs." She turned over a gastropod shell in order to get a new view for sketching. "I studied tetrapodal

anatomy, but I'm beginning to wish I'd learned more about sea life. These shells are beautiful."

"Anything you paint is beautiful."

She ignored that. "What do the live animals look like?"

"Like snails. That's what they are. As they grow larger, they add on to their domiciles, forming the spirals you see. Because the result is really a horn—an expanding tube—it is possible to sound a note on the empty shell, when it is properly prepared. Thus Veg's conch, or 'conk'. He'd have trouble sounding a blast on an ammonite, though."

"Which of these are ammonites?"

"None. They're extinct. That's one reason I know this is the Paleocene and not the Cretaceous period."

"How can you be sure? Maybe you just didn't happen to scoop up any ammonites." She was teasing him, anticipating his reply.

He made it anyway, enjoying her smile. Any dialogue with Aquilon was pleasant, even back when she had had no smile. "My dear, you are asking for a tedious narration of marine paleontology—"

"Oops—not that!" She continued painting.

"The major distinction between the shells of the gastropods and those of the cephalopods is compartmentalization. The snail-shells are hollow throughout, forming a single valve; but those of the cephalopods—"

"You forgot to tell me what cephalopods are," she said. "What do *they* look like, in life?"

"Squids in shells. Your snails and clams are sluggish in the mature state, but the cephalopods are active. They have keen eyesight and are strong swimmers, despite their hardware. They have a number of tentacles around the mouth. The cephalopods as a class have been abundant

and important in the seas for well over three hundred million years, and are the only invertebrates able to compete actively with the ocean vertebrates. The giant squid—"

"But you were talking about shellfish, not squids!" She was still teasing him, and he liked it very well.

"Mollusca. Some wear their shells outside, some inside. The squid's shell is vestigial and internal, so you're not aware of it. The ammonite shell is external and, as I was about to explain, chambered. Segments of the interior are walled off as the creature grows, and these are filled with gas to make the dead weight more manageable. A sophisticated, highly successful format—and the ammonites were virtual rulers of the sea for a length of time that makes the tenure of the great reptiles on land seem brief. Yet the ammonites suffered a series of calamitous decimations, marking off the Triassic, Jurassic and Cretaceous periods, and finally became extinct just before this Paleocene epoch. Their passing is, to my mind, a more subtle and significant mystery than that of the complex of reptilian orders that claims popular attention. In fact, the ammonites passed at about the same time as the dinosaurs."

"The same time," Aquilon repeated, seeming to appreciate the significance of that. "But some reptiles did survive, and some molluscs." She had finished her painting.

"A few reptiles like the lizards, snakes and crocodiles. And turtles. But none of the ammonites, only the related but more primitive Nautiloids. They have the septa in the shell—simple, saucer-shaped partitions—but with comparatively unimaginative convolution. The ammonites in their time developed extraordinary elaborate fluting, and with much greater variety."

"We shouldn't stay here," she said,

evidently tired of paleontology at last, "on this island."

"I've hardly begun to catalog—"

"Circe says something is happening."

He studied her, realizing that she was seriously concerned, and had only listened to him in order to have time to settle her own thoughts. Circe was her manta, just as Hex was Veg's, and news from that source had to be taken into account.

"Can you be more specific?"

"We don't have the terms, the words. But it's something big. She doesn't know whether it's dangerous, but it might be. Something about the water."

"Storm?"

"I don't think so. And we'd know about that ourselves, wouldn't we?"

"We should. We have a fair selection of meteorological instruments. The barometer doesn't indicate trouble, and we'd have some advance warning if a hurricane were coming. Enough to retreat to the undersea tube, I'd think. Could the water be polluted in some way?"

"We'd know about that too, wouldn't we? What would pollute it, here?"

He shrugged. "What indeed, without man's machine age. Perhaps I should question Circe directly."

He could tell by her attitude that this was exactly what she'd had in mind. Aquilon put two fingers to her mouth and delivered a piercing whistle, astonishing him. In a moment the disk-shape of a traveling manta rounded the curve of the island, moving at a good thirty miles per hour over the water. Circe.

"What's this I hear about the water?" Cal inquired as the creature came to rest before him.

Circe did not move or snap her tail, but Aquilon responded. "She doesn't know what you mean, Cal."

"There is something wrong with the

water," he said, making it a statement.

Now Circe snapped her tail twice: NO.

"Something *will* be wrong."

Three snaps: QUESTION.

"The water will change."

YES.

"Warmer."

NO.

"Colder."

NO.

"Higher."

YES.

Suddenly it clicked. "A wave!"

YES.

"Tsunami!"

QUESTION.

"A big wave caused by movements of the land. Very big."

YES.

"How soon? One day?"

NO.

"Sooner?"

YES.

"Twelve hours?"

NO.

"How many hours?"

Six snaps of the tail.

Cal stood up. "Get Veg. We have to get off this island in a hurry. We have just about time to batten down before it hits."

Circe was up and away, though he had been addressing Aquilon. That was just as well; the manta could spread the news more efficiently.

But Veg, when notified, threw an unexpected block. "No. I'd rather ride it out right here. I don't want to go back in the can."

"It would only be for a day or so," Cal explained, but privately he shared the big man's reluctance. They joked about Veg's obtuseness, but he generally knew what was going on. And by this time the spore-problem at the orbiting station would be in full swing, and the personnel could be in a

very bad mood. "Until the danger is over. Then we can resume work here."

"Well, I've been thinking," Veg said. "Out here in the sun and spray, no problems, no people crowding together, not even rationed cutting rights. I like it. It's the way a man is meant to live. Down there—we'd be walking back into the tin can, squeezed tight. That's what the trouble is back on Earth. Crowded. Here it's good; there it's bad. I don't want to go back. At all. Not even for a day."

Uh-oh. When Veg "thought something out" he could be obstinate, and the irony was that Cal agreed almost entirely. It was possible that they would be in greater danger in the tunnel than on the island, though from a different source. But at least they could remain near the borer-exit. "Let me explain what a tsunami is," he said carefully. This was for Aquilon's benefit too, to be certain everyone knew what the choices were. "An Earthquake or erupting volcano can do enormous damage on land, but if it is in or near the sea it acts in a different way. It makes a wave—a shift in the level of the water, a number of inches or feet. This wave travels at a rate governed by the amount of the disturbance and the depth of the water; it is a top-to-bottom matter, not just a surface ripple like those the wind makes. In deep water its forward velocity can exceed six hundred miles per hour. Because the vertical displacement is proportionately small, ships at sea may not even be aware of the tsunami's passage—but once it strikes the shallows, its full impact is felt. Forward momentum is converted to vertical displacement. The water can rise up in a wall a hundred feet high, and demolish shore installations with its impact.

"Now we don't know how bad this one is—but this is a small island without any really high land. A large wave could

inundate it completely. Back on Earth such waves used to kill thousands and carry ships miles inland. Here—"

"Only three people, and four mantas," Aquilon said. "Hardly worth its while."

Veg retained that determined expression. "You said ships could ride it out."

"Ships in deep water, yes. Not those too near the shore."

"How about a raft?"

"A raft!" Aquilon repeated, becoming interested.

"The matter is academic," Cal pointed out. "We don't have a raft—unless you're thinking of the emergency balloon-type craft. I wouldn't care to risk it. One puncture—"

"How about a log raft? Good solid timbers, rudder, cabin, sail—"

So that was what Veg had been doing! Trust an outdoorsman to put his talent to work. "All right, Veg. Let's see it."

The raft floated in a cove on the far side of the island, about twelve feet wide and twenty long, fashioned of stout round palm logs bound together by nylon cord set into notches. In the center was a cabin six feet square, and from the center of that rose a ten foot mast of sturdy bamboo.

"Haven't made the sail yet," Veg admitted. "But she has a six foot keel and the cabin's tight. I call her the Nacre."

"And you hope to ride out a tsunami in this?" Cal shook his head, though he was impressed with his friend's accomplishment.

"Why not? You said ships wouldn't even notice the wave. Nacre's unsinkable. And we have to look about this world sometime."

"It seems reasonable to me," Aquilon said.

Cal tried to marshal his objections, but saw that he had already been outvoted. Or was he compensating for his own

unreasonable desire to get far away from the works of Earth-contemporary? Or could he actually *want* to reach some area of this world where their actions might prejudice the development of the primates, and therefore abolish man from the globe entirely? No, the paradox inherent made that notion ridiculous. "I hope there is a survivor to tell the tale," he said morosely.

It required four hours of strenuous group labor to load their supplies and tie everything down. Cal had to agree that it would not have been feasible to convey everything to the undersea tunnel in that period. They would have had to sustain a serious loss of supplies, unless the wave were minor. But Circe could probably not have detected the advance tremors of a minor one. Perhaps this raft, fragile as it seemed, *was* the best alternative. But with only two hours to reach deep water, and no sail—

They boarded and pushed off without ceremony. Veg poled the craft out from the island while Cal and Aquilon paddled as well as they were able with splayed palm flower pods and the four mantas circled on the water. Cal was glad he had recovered enough of his strength to make a decent show of it. Six months ago he would not have been able to lift the crude oar, let alone use it effectively. He owed his resurgence to Nacre—the planet, not the raft—that had been inhospitable to man's physique but excellent for his spirit.

No—the planet had been no more than the locale. The benefit had been due to the true friendship of two people—*these* two people—that had faced him back toward life.

He continued to row. His arms were tired, but the thought of that approaching wave kept him working. *How had* the mantas known of the tsunami? They could not have detected a shock wave in the

water, because the wave *was* the shock. Yet he was sure they were correct, for they did not make mistakes of that nature. Something important would happen with the water, and if it was not a wave he had misinterpreted Circe's message. There must have been a vibration that their peculiar eyesight had picked up, or a radiation typical of large land movements. Something that not only signaled trouble, but allowed the mantas to judge its time of arrival.

There was still much to learn about these fungus companions. And much to learn about tsunamis.

All loose equipment was in the cabin, and that tiny enclosure was tied together and sealed as well as limited time and resource permitted; but Cal retained grave doubts about the outcome of this jaunt. He was not afraid of death—actually, he rather approved of it as a natural institution—but disliked contemplating the premature termination of the young lives of those who had befriended him. And there was the group's mission to be considered: the charting of life on this Paleocene planet. Better to die after the mysteries of this world had been fathomed and the report made; then the effort would not have been wasted.

Veg took over Cal's oar as soon as they were out of poling depth, and Cal moved gratefully to the rudder. This was little more than a paddle tied between two projecting legs, and in view of the Nacre's overall clumsiness seemed almost useless. But they did make steady if tedious progress toward the open sea.

They had hardly gotten far enough before their time was up. Cal had carefully directed them away from the direction Circe indicated for the oncoming tsunami, so that the island stood between them and it. He hoped they would thereby escape the worst of it even though the water was still

too shallow for safety. The swell should bear them *away* from land, rather than into the turbulence of the shallows.

The time came—and nothing happened. "False alarm," Aquilon announced, sounding uncertain whether to be annoyed or relieved.

"Not necessarily so," Cal cautioned her. "The first signs of the typical tsunami are inconspicuous. A very small rise in the water level, followed by a deeper trough. But the second or third real wave shows its full mischief. Keep paddling."

Aquilon looked dubiously at the serene island behind them. "I somehow thought a tidal wave was a tall wall of water striking without warning," she said.

"That may be true enough, for those on land who aren't alert for the signals. Of course 'tidal wave' is a misnomer. The phenomenon has nothing to do with the tides."

Veg kept paddling.

Fifteen minutes passed placidly. They nudged farther into the ocean.

"Are you *sure*—?" Aquilon inquired.

"Of course I'm not sure," he told her. "It is possible that we misunderstood what Circe was trying to tell us. It is also true that most tsunamis are not serious affairs; that depends on the severity of the incitation and its distance from the observer's position."

"Now he tells us," Veg muttered.

"However, Circe was alarmed, and I suspect she had good reason," Cal said. "Because of the masses of water involved, the waves may be over a hundred miles apart. I wouldn't count the danger as over until a couple more hours pass."

Veg shrugged and kept working on his oar. "Quietest calamity I ever survived."

The four mantas had been ranging out, then returning to the raft to rest. They seemed to require frequent quiescence. Cal had never had the opportunity to watch



them in action for days at a time like this, and it was instructive. On Earth he had found them a secluded island to camp out on, and had seen them only occasionally thereafter. There had never been a laboratory analysis of their metabolism, but he suspected that it was not conducive to sustained energy output of the level of Earthly animals. They were cold-blooded, for one thing. Not that their body fluid resembled blood in any chemical way, or that it was actually cool—but it did suggest a basic conservation of energy. Cold temperature inhibited them; that was probably the main reason the majority had elected to stay with him in the subtropics, on Earth. They were saprophytes, feeding on the breakdown of organic matter; to what extent did temperature affect their chemistry? Or were they inhibited now because they were primed to spore upon death—a state that must be equivalent to pregnancy in a mammal? The mantas he had seen die on Nacre had not spored, since their deaths had been unexpected and they had not been primed.

Now they were resting. Fatigue, boredom—or in preparation for some unusual stress ahead? It pained him to be so ignorant.

Forty minutes after the scheduled arrival of the tsunami, Veg saw something. He stopped rowing and watched. The others, noting his reaction, did the same.

It was as though a weathered mountain were rising on the horizon behind the island. The water humped up grotesquely, its main height concealed by the island foliage. Even so, the swell was not really striking; the highest point could not be much more than thirty feet above sea-norm.

"We could have weathered that," Veg remarked.

Cal kept his peace. He knew what was coming, and his mind's eye augmented the

visible traces. The wave was rising on the shallows leading up to the island, the same submarine slant they had walked up from the tunnel. From the look of it, there was a fairly extensive submerged reef angling across the path of the tsunami shock-wave.

Near the island the rolling swell became a peaked wave at last, showing a tumbling white crest and emitting an increasing roar. The water formed into a vertical wall—he heard Aquilon's intake of breath—and crashed over the green landscape. A cloud of spume went up, as though a tremendous explosion had sundered the island. A rainbow appeared in the sky, tribute to the water sprayed high into the atmosphere.

"We could have weathered that!" Aquilon said, mimicking Veg's remark without malicious intent.

"Yeah," Veg agreed absently.

Then the misty wake was upon them. White foam surged by the raft, lifting it precariously and causing the logs to shift against each other. Bits of island debris bobbed about.

The swell subsided and they viewed the island again. From this distance it seemed unchanged, but Cal knew that terrible havoc had been wreaked there. The mantas' warning had been valid.

Reminded, he turned to check on their otherworld associates. Circe, Diam, Hex and Star stood on the roof of the cabin looking miserable. They would have had difficulty running over this wave; its changing configuration and bubbly surface could easily have inundated them. Though a manta could "walk" on water, it could not swim within it, except for very brief scoops at speed. A manta had to keep moving swiftly or stop entirely, when the surface was liquid. These four needed the raft more than the humans did, in this instance.

Yet they could have avoided the problem nicely by traveling over deep water, where

the swell of the tsunami was mild. Did they feel an emotional loyalty to the human party? It always came back to what he did not know about them. Right now, however, his job was this planet, not manta.

In due course the second wave crashed over the isle. Others followed at about twenty minute intervals, but the worst was over. The raft had saved the party.

"I believe it is safe to return now," Cal said at last.

"Why?" Veg asked.

Cal looked at him, so tousled and sweaty and strong. "Are you implying that the raft is better than a land base?" The notion was foolish; there was not room to spread his shells or keep them secure, let alone acquire more.

"I'm implying we can't travel far on an island."

"Travel! These winds are obviously seasonal. Once we drift from this vicinity, we'll be unable to return for months."

Veg nodded.

So it was coming into the open already: the decision to mutiny, to break contact with the Earth authorities. Not completely, for the radio equipment could keep them in touch. But since they would be unable to return if so directed . . .

Veg wanted simply to isolate himself from a hateful influence, and Cal understood this entirely too well. Yet he could not so casually justify the abrogation of the mission. They were not here on any vacation, and too obvious a balk could trigger the trouble already building for them.

In addition, if this were Paleocene Earth, the consequence of activity on the mainland could ramify appallingly. What *about* the paradoxes of time travel? They had not yet done anything significant, for their traces on the island would have been wiped out by the tsunami—but such fortune could not be

perpetual. What would happen when some action of theirs threatened to change the nature of their own reality? Such paradox was patently impossible—but the situation could be extremely delicate.

"It seems to me we would have to move about a bit to gather information," Aquilon said. "For a proper report, I mean. We should at least map the continents—"

"Map the continents!" Cal knew she meant the floral and faunal features, since they already had the map, but still it was an excuse. "That would take a full-fledged survey party several years with a cartographic satellite. And we already know what they would find."

"That reminds me," she said. "That map. How did you know—"

"I'd have to go into paleogeography to explain that. It—"

"Summarize it," Veg said, irritated. He was holding his paddle and seemed anxious to use it, rather than talking. But Aquilon must have brought up this matter now in order to make sure Veg knew about it.

Summarize the concept of drifting continents? Cal sighed inwardly. It had to be done, though, and now did seem to be the time. Now—before they committed themselves to the mainland. "The crust of the Earth may seem solid and permanent to us today, but in fact it is boiling and moving steadily. Like the surface of a pot of cooking oatmeal"—he saw they didn't comprehend the allusion, but let it stand—"it bubbles up in some regions and cools and solidifies and sinks down in creases elsewhere. Segments of the more solid, lighter material float, collecting above the creases until large masses are built up by this action. These are the continents—or rather, the single continent, that formed billions of years ago, then broke up as the convection patterns changed, drifted, reformed. Two hundred and fifty million years ago there were two

great continents, two halves separated by narrow seas: Laurasia in the north, Gondwanaland in the south. These broke up into the present continents, and changes are still occurring. In time the Americas may complete their journey across the oceans and rejoin the main land mass from the other side—"

"Watch it," Veg said. "You're theorizing."

"Now I remember!" Aquilon said. "They verified the continental drift by checking the magnetism of the ocean floor. The metal in the rocks that bubbled up was aligned with the magnetic poles as the material cooled and hardened, so there was a record, and they could tell where it had been when."

"Something like that," Cal agreed, surprised that she had made the connection. "There were other ways to corroborate the phenomenon, too. Computer analysis showed how certain continents, such as Australia and Antarctica, made a precise fit despite being separated by two thousand miles of water. The underlying strata also matched. All over the world, the changing continental geography could be interpolated to show the configuration for any particular period. The map I had you sketch strongly suggested the Paleocene epoch, since the major continents as we know them had only recently severed from the main masses and remained relatively close together."

"So where are we now—on Earth?" Veg asked.

"Our island here is some distance off the coast of what will be known as California. In our time Western America has overridden one of the Pacific rifts and so developed the San Andreas Fault, a source of regular earthquakes. This has been an active area of the world for some time, and no doubt this tsunami stems from—"

"We can't just sit here talking," Veg grumbled. "There might be another wave."

"And we really should take a look at California," Aquilon said. "The westerlies should take us right there, and I could paint some of the animal life for your report."

Cal perceived that she had an ulterior motive. She didn't truly comprehend something until she painted it, and she was intrigued by the notion of treading the soils of the past. She was not concerned about paradox.

"We aren't operating as an isolated party," he said. "There could be consequences—"

"Maybe we should take a vote," Veg suggested.

Cal already knew the outcome of that. Trust the group to revert to elementary democracy, on this wilderness world. The others were not trained to appreciate the enormous fund of information available on the single island, or to anticipate the vagaries of seemingly steady wind. It would be far safer to remain here, and more efficient. Though there *was* that matter of the spores in the station . . . and he could not outvote the two of them.

"Four out of seven?" Cal inquired.

Veg and Aquilon exchanged glances. They had not thought of this. If the precedent of voting on key decisions were established, the precedent of including the mantas as franchised individuals would also be in force.

"Manta suffrage," Aquilon murmured.

In the course of a difficult discussion the nature of the voting concept and practice was conveyed to the mantas: each entity to cast his ballot, the minority amenable to the will of the majority. Cal wondered whether the fungoid creatures really understood. They could easily cast a bloc vote. Should they have been considered as a single entity, one vote for the group of them? Too late

now.

Cal called off the names in alphabetical order. Each voter would advance to the bow if he wished to travel on the raft, and to the stern if he wished to remain based on the island.

"Quilon." She stepped to the bow, and the tally stood one to nothing, raft.

"Cal." After he spoke his own name, he moved to the rear. The truth was that he did want to explore, and to get away from Earth's influence—but he did not want to alarm the others by giving his reasons, or to have it on record that he approved the jaunt. There were sometimes distinct advantages to a split decision, particularly when the results would be recorded and evaluated by unfriendly officials.

"Circe." Here was the test: which way would the manta jump?

Circe hopped to join Aquilon. Two to one.

"Diam." This could decide it, for Veg surely wanted to explore, and that would make a majority.

Diam bounded into the air, shaking the raft by the force of his takeoff, flared, and came down beside Cal. Two to two—and they were *not* bloc-voting!

"Hex." That was Veg's companion. But if Circe had joined Aquilon from personal sentiment, Hex could not do the same, for Veg had not formally committed himself.

Hex joined the bow party, and it was three to two. The issue had been decided, but the vote had to be officially completed.

"Star." Star had stayed with Cal throughout, as had Diam. Would he choose accordingly, as a matter of academic curiosity?

Star did. Three to three.

"Veg." And of course Veg went forward. The issue had been decided. And, perhaps far more significant, the mantas had voted as individuals.

The party of seven was about to travel, and he was glad.

Chapter 7: Orn

TIME WAS LONG, yet it was nothing, for he only wandered and grew. He crossed inland mountains—the kind that developed from shifts and buckles of the ground, rather than ash and lava—and plains and swamps, bearing east. Though he ran his limit each day, stopping only to feed himself, the summer was waning before he reached the new ocean formed from the widening chasm between land-fragments. He had verified his general map: this land was now far away from its origin, and was still moving.

Increasing cold nudged him south. Many things had changed, and much of the landscape differed substantially from that of his memory, but that was the way of the earth. It always changed, as the waves on the seas changed, and so had to be resurveyed periodically for posterity.

The mams were everywhere. Small primes twittered in the occasional grassy areas, burrowing for grubs and tubers, and some peered at him from trees with their great round eyes. They were generally fragile and shy, yet numerous; he fed on them frequently. Every so often he brought down a dino, horned but clumsy for a mam, and not very bright. This creature tended to become absorbed in his browsing, and not be alert for danger.

There were also a number of snakes, and many liz and small amphibs, all feeding on the plentiful arths. And Orn did too, tearing open anthills with relish and picking up the scurrying morsels with his gluey tongue. Never in his memory had there been such regular feasting!

Aves filled the trees, benefiting even more from the arth supply. The birds had become more diverse than ever, and were now excellent fliers. Several lines swam in the ponds and rivers, and others ran along the ground as he did, though none of these were closely allied to him. His line had been landbound longer, and during more dangerous times; thus he was larger and swifter than these newcomers. Many of the others would never have been able to survive attack by a running rep.

Winter promised to be far more severe than his prior one on the island. Orn continued driving south, making good progress; yet the cold stalked him. There was nowhere he could set up a regular abode. He could withstand freezing temperatures for short periods, but this sapped his strength. His plumage was not thick enough to protect him against a prolonged siege, even though many smaller birds endured winter well enough. He was becoming tired of perpetual travel; he was almost full-grown now, and beginning to respond to developing urges for other things.

He did not recognize in himself the nesting impulse, for only the sight of a nubile female of his species would clarify that. But he carried on with increasing and undefined hunger, hurrying somewhere while wanting to stay where he was. It was not only the onrushing season that disturbed him.

At last his southward progress was blocked by mountains. They were volcanic, and therefore to be treated with respect and fear. He trotted west, seeking a way around them, but was met after a day by a great ocean. He had crossed the continent again, intersecting the coastline here where the land mass narrowed. He had either to give up or to proceed on through this region; the nights of the inland area had become far too

cold now for his comfort.

The range extended into the sea, the individual summits diminishing to islands and finally reefs. These isles would be warm, he knew—but Orn did not care to set up residence in such a precarious locale again. He could abide a quiescent volcano, or an island, but not the combination. That was too much of a trap.

So it had to be the land route. He had no memory of the territory ahead; the configurations of this landscape had shifted too rapidly and drastically in the past few million years. The wall of volcanoes was new, certainly—and if any prospective ancestor had penetrated it, that bird had never emerged to sire his line thereafter. Sometimes what Orn could not remember spoke as eloquently as what he could.

He found a promising avenue a few mountains from the coast and moved in. It was a pass of a sort—a fissure between two of the lesser peaks, overgrown with bracken and a tough new strain of grass. Some water trickled along it, but not enough; he risked thirst here. But better that than the other flow—of liquid stone.

The mountains were dead. He could read their histories as he passed, observing the remnants of ancient lava fields and mounded ash. The sides of the gully were weathered and overgrown with brush. He made a foray up one slope and brought down a young, slow-footed ambly who had strayed into this inhospitable region. He severed its jugular with a single contraction of his beak muscles, and fed quickly on the warm carcass. There was far more meat than he could consume at one time, but he had to tolerate the waste this time because of the need to save his strength for the climb ahead. An arduous, tedious search for small prey at this time would have worn him down, though ordinarily he killed no larger than his hunger, however vulnerable the

prey.

The air was cold as he fed, and the warmth of the flesh he swallowed was fleeting. Almost, he desired a little more activity in the old fire cones. Almost.

In the morning he outran the cleft and crossed the steep side of the smaller mountain, stiffening his feathers against the chill wind that struck at this height. Then he was over the pass, and it was warmer on the other side. Too much so: he smelled the fumes of an active volcano.

There was no way to avoid it. The cold of the heights forced him to seek the lowest valleys, and from the great basin ahead rose the live cone. Fires danced upon its rim, reflecting from the hanging clouds above it, and as Orn approached the ground quivered ominously.

It took him a full day to skirt it, and he watched its every malignant gesture. This was not a lava-mountain; this one was the more deadly gas and ash type. No plants grew near it. Yet he found arths amid the tumbled rocks of its perimeter, and one semi-stagnant pond, so his hunger and thirst were partially abated.

On the southern slope it caught him. Monstrous gases swirled out of its cruel orifice, forming a burgeoning cloud that glowed of its own accord. As night came this cloud drifted south—following Orn. As it gained on him, slow-moving as it seemed, the thing began to rain: a downpour of incandescent droplets that accumulated voluminously on the ground.

Orn fled before it, knowing that the smallest touch of that fiery storm meant annihilation. He did escape—but his retreat had been sealed off. He could not know what lay ahead, but death lay behind.

Exhausted, he perched at last upon a jagged boulder and slept nervously amid the drifting fringe-gases of the storm. In all that murky region there was nothing alive

but him.

Next day he came across a spring of boiling water. Where it overflowed into a basin and cooled sufficiently, he washed the cutting grime from his feathers and felt clean again. Once more there were arths; he scratched for grubs and had a partial meal.

After that there was more even ground, and he made good time though the unusually rough turf abraded his feet. The rocks were warm, and not entirely from the sun, with many heated ponds. He washed cautiously and drank the richly flavored water dubiously, but found no fish. He avoided the boiling mud and steaming fumeroles, and particularly the active cones.

It was an awful landscape, jagged in the distance, bare and dead up close. He longed for the end of it, but feared that there was no end. He felt too vulnerable without his memory to guide him.

Gradually the land leveled into a desert, and though Orn made excellent time here, he had to go without food and water for two days. A third day would finish him, for his metabolism was rapid. Not at once, but by crippling him and thus preventing any possible escape. Yet he also lacked the resources to retreat. He pushed on. There was nothing else to do.

Though the evening brought relief from the ambient heat, this was scant consolation. The cold was severe, and he had to roost on the ground and half bury himself in dust as a hedge against it. Now he had no way to cleanse his feathers properly or to slake his terrible thirst. He almost felt like a mam, the way this territory wrung the moisture from his body; but no mam could have traveled this far.

On the second morning he lay stiffly for a time, waiting for the sun to restore what energy it might to his body. His flesh, under the battered and poorly insulating feathers, was dehydrated—yet he knew that the day

would soon dry it out farther. Would it be more comfortable to rouse himself for the terminal effort, or to lie here and let death visit him peacefully?

Across the brightening desert he saw the sunlight stab at a rising wisp of mist, giving it momentary brilliance as the beam refracted. This was the single instant of the day that these barrens had beauty, however slight.

Then his memory informed him what mist meant. Orn lurched to his feet, flapping his stubby wings in his eagerness, and staggered forward. He was weak, his feet were bruised, his muscles hurting, and he doubted that he could crack even a hard nut with his beak—but he covered the ground.

There was a gully where the mist had been. Within this depression was a cleft similar to the one he had followed into this badland. And at the bottom of this crevice was a tiny flow of water.

Orn dug a pit in the sand with his broken talons and set his head in it. He lay there and let the water trickle over his tongue.

He remained there all day, and by night he was not thirsty any more.

He followed the riven gully down, too hungry now to sleep. A quarter day's trek below his point of interception the first stunted vegetation appeared. He dug it out in the dark and swallowed it, hoping to find nutritious grubs within. He had not recovered enough to be able to tell by smell. Then he relaxed.

The following day was better. The cleft, at first only a few wingspans across, broadened out into a winding canyon, and creeping foliage covered its shadowed sides. It was hot, but not nearly as bad as the burning desert. The miniscule water had been reinforced from offshoot crevices and gathered into a running brook. Orn traveled slowly and recovered his strength.

At last there was enough water pooled for a proper washing, and he bathed with delight. Once more he could fluff out his feathers and protect himself better from cold.

But on the second day he climbed the canyon wall and poked his head over the rim and spied—a steaming mountain. He was not out of the volcano belt yet; the desert and cleft had been only a hiatus.

The canyon widened out and finally the water in it leveled and became salty. He was back at the sea.

But with a difference. He had passed the first major belt of mountains and reached a warmer area. He might be able to make a winter nest in a burrow by the water, within the protected canyon, and feed on fish.

Then he discovered the underground river.

It opened into the canyon wall: a squat tunnel from which warm water poured. He braced himself against its gentle current and entered the cavern. Light spilled from natural vents in the ceiling, and he saw stone columns he recognized as typical of such places. His ancestors had often stayed in caves. This was better, much better; he could winter here in comfort, going outside only to forage.

Unless other animals—predators—had the same notion.

Orn sniffed the slowly moving air. The worst came to him then, hidden before by the lingering insensitivity left over from his desert thirst: the rank odor of a large rep.

He sought out the source, alert for rapid retreat. Not all reps were inimical, and this smell was borderline.

He found it lying half-submerged. It was a para, five times Orn's own length and many times as massive. Its four feet were webbed for efficient swimming, and its tail was long and powerful. There was no armor on its body. Its head was equipped with a

large scooplike bill that Orn remembered was used to delve into the soft muck of shallow ponds. It had a monstrous bony crest that projected back so far that it effectively doubled the length of the head. Through this process the nasal passages ran, and to it the hot blood of the active animal was pumped for cooling in the heat of the day. Too much heat was deadly to reps, and the large ones had trouble dissipating it; thus this evaporative cooling system gave the para an advantage over his cousins. Neither exertion nor noon sunlight was likely to harm him.

Nevertheless, the para was dead, its flesh rotting.

This was a creature of the old type. Orn had not seen such a rep in anything but memory before, except for the crocs, but it was familiar in a way the tiny mams were not. Paras were among those reps who had dominated the world for much of his memory, and who until this moment had seemed to be absent from it.

Yet something had killed it. Not an animal enemy, for the creature was unmarked except for those bruises typical of inanimate encounters, and post mortem infestation. Not thirst or hunger, for it was sleek and in potable water.

If this superbly-equipped animal had succumbed within this cavern, far more its natural habitat than Orn's, how could Orn expect to survive?

Better to brave the dangers he knew, than to subject himself to the sordid and fatal mystery of this place. He would have to continue his journey.

Chapter 8: Aquilon

THEY SAILED due east. The Nacre's yardwork was crude—a wedge of rubberoid

sheeting buttressed by palm fronds suspended on half a dozen transverse bamboo poles, vaguely in the manner of a Chinese junk. Nothing better had been available. It would have taken them weeks to form a suitable sail from natural materials, and they might not have held the wind any better than this cut-and-stretched balloon material.

When Veg wanted to slow progress, he let out a supportive rope and the sail collapsed in a mess of sticks; when he wanted full power, he hauled it back up, using all his brute strength.

It functioned, anyway. When the breeze was stiff, Aquilon judged that they made as much as five knots. Ordinarily the rate was more like two. Thus they traversed from fifty to a hundred miles per day, for the Nacre never rested. Respectable progress!

The sea air was balmy, the day clear. But the perpetually rolling waves lifted the raft, tilted it, dropped it, and lifted it again interminably, and very soon she was feeling more than queasy. She was sure the men had a similar complaint. She felt sorry for Cal, hanging bravely to a rope knotted around a log. Not only did he seem to be in continual peril of being washed overboard—that was why he had the rope—but he looked quite sick. Veg didn't complain, but he hadn't eaten all day. Aquilon herself had simply puked into the water and felt better for a while—until being blessed with the dry heaves. She wondered whether the mantas, perched in the cabin shade, had equivalent difficulties.

She tried to distract herself by watching the sights. The heaving seascape was no help at all, but she found she could see a good deal by donning her diving mask, immersing her head, and peering down through the water. Once she learned the trick of compensating for the flexing facade of the surface.

The sea, at first glance so desolate, was actually full of life. Aquilon had some familiarity with fish, having painted them many times and also done a number of dissections for anatomical illustrations. The species here were not identical to those she knew, but they fell into similar patterns, and some were so close she was sure only an ichthyologist would be able to differentiate the types. A school of herring drifted directly under the raft, flanked by a shark she couldn't quite see. Then a four-foot tuna cut across, and suddenly several flying fish broke surface and skated over the water, their fins spread like the wings of insects. Half an hour later she spied several cod, then some jacks, and finally a great lone swordfish fully eight feet long.

She lifted her head at last and doffed the mask, deciding that her seasickness was coming under control. It was late afternoon. The two men seemed listless, perhaps dulled by the monotony of the waves. Veg was spume-flecked; Cal now leaned against the cabin. The four mantas remained where they had been. They would not venture forth in direct sunlight, of course; that was too rough on their eyes.

"Tennis, anyone?" she inquired with mock cheer. "Or maybe supper?"

But no one replied, and she wasn't hungry herself. There were supplies on board for several days, so foraging from the sea was not necessary. Yet.

She pondered this, since she was already feeling dismal. Suppose the map were wrong, and California was not within three or four hundred miles? Suppose they had to remain on the raft for two weeks? By then the stored food would run out, and the canned water. If they were to survive, they would have to fish, consuming the flesh and grinding out fish-body fluids to drink. It was feasible; they all knew the techniques, and the necessary equipment was part of the

life-raft package. But Veg would not touch fish, himself, and might refuse to bring in any for the others. She could do it herself—but she now shared Veg's viewpoint to a considerable extent, though her rationale was different, and wasn't sure she cared to go back to an omnivorous diet. It would make her feel unclean. Would she eat fish if she got hungry enough, and drink fish juice? Would she kill another living, feeling creature in order to slake her own needs? She didn't know—but the feeling that she *might* made her feel unclean again.

What value was a moral standard, if it disappeared the moment it became inconvenient or uncomfortable?

They took turns sleeping, one at a time—not from any urge for privacy but to insure that two were always alert to the vagaries of the sea. Their collective motion-sickness was responsible for the pessimistic outlook for the voyage, she was sure—but meanwhile caution was their only resource.

She lay alone in the cabin, listening to the slap of the waves against the logs and trying to ignore the swells of brine that inundated the nethermost centimeter of her torso at irregular intervals. In time, she knew, she would acquire the reflex to hold her breath even in her sleep for those essential seconds, and would not even notice the involuntary baths. Human beings were adaptable; that was why they survived.

Survival. It seemed to have less to recommend it recently. How blithely she had cast her ballot in favor of this stomach-wringing journey! Cal, at least, had foreseen what it entailed. One overruled his judgment at one's peril. Now it was far too late to change course; the force of air driving them along would not permit it. With this clumsy vehicle they could not hope to tack into the wind effectively—and even if they could, it would take twice as

long (at best!) to return to their island as the outward trip had taken. There was no way to escape at least another day of oceanic violence.

Yet she was dead tired, and sleep had to come. The mantas seemed to be comfortable enough on the cabin roof, so why couldn't she be likewise here? Gradually she acclimatized and passed into a fitful dream state interspersed with ten-second cold shocks as the pseudo tide touched her again and again.

She found herself—no, not back in her cosy Earth apartment, for that physical comfort was empty in the face of the intellectual horror on which it rested. She did not like Earth; she had no fond memories to bind her to it. Space meant more to her, Nacre meant more, and the easy, sexless companionship of these two men. Her dream was of current matters, her nearest approach to joy: the day and night just passed on the island.

She stood conversing with Cal, and he was taller and stronger than in life, and simultaneously she painted the shells of his collection. They were ammonite fossils, extinct just yesterday, geologically speaking, hardly ten million years ago. And her picture grew as she filled in the color; swelled and became real, and then she was walking into it, or rather swimming, for it was a living ocean habitat. All around her floated the cephalopods, their shells coiled, straight, or indecisive. Most were small, but some were large—fist-sized, even head-sized, their tentacles spread out hungrily, fifty or a hundred for each individual, plus the two larger feeder-tentacles.

She was stroking lithely, but these clumsy-seeming molluscs were more agile. Their bodies matched the specific gravity of the water so that they neither lifted nor sank involuntarily, and they moved rapidly backwards as they jetted water from their

hyponomes. She could not catch any in her hands, try as she might. Soon she gave up the attempt, and then they drifted confidently closer to her, shells sparkling iridescently.

It was a wonderland of bright living coral and sponge and jellyfish and crabs and forestlike seaweed, with the abundant 'bony' fish circulating everywhere. But the cephalopods dominated the scene—small squids shooting past in shoals, almost indistinguishable from fish at that velocity; their relatives the belemnites, and the nautiloids and ammonites. The molluscs did not swim in the manner of vertebrates, however; they all moved by that jet-propulsion, using their finlike members only for guidance. The belemnites were cigar-shaped shells completely surrounded by flesh, almost like little manta-rays with backbones fused.

They were feeding now, culling animalcules and tiny fishes from the water with their myriad tentacles and bearing them in to the mouth parts. Their big round eyes stared at her as she went along. The individuals were getting larger; some were more than a foot in diameter, across the coiled shell, and their short tentacles were six inches.

Their shells were varied, but nowhere did the markings of the septa show. She remembered that Cal had explained about that: the sutures were the internal joining places of the septa, analogous to the dark rings inside a poorly washed coffee cup. They did not ordinarily show externally. Where the septum, or disk blocking off a segment of the interior was flat, the suture merely ringed the inside of the shell. But the more advanced ammonites had fluted sutures, reflecting a convoluted septum. She visualized the situation, using a straight shell for convenience rather than a normal coiled one.

The sutures became more and more complex as the ammonoids developed, until in the middle Cretaceous they were phenomenal. Loops formed within loops, resembling the profile of elaborate branching coral.

Aquilon contemplated an ammonite fully eighteen inches in diameter, tentacles as long as her hand reaching out from it. The creature was impressive in much the manner of a monstrous spider. She waved her hand at it, and it snapped back into its shell, closing its hood over its head. She laughed, making bubbles in the water (*where did she find air to breathe?* she wondered fleetingly, but this was immaterial) and waited for the cephalopod to lift its anterior portcullis and peep out again. So much like a hermit crab, she thought—only this was a hermit octopus who constructed its own shell.

"Take me to your leader," she said as its eyes reappeared.

The ammonite nodded with its entire body and jetted away, its tentacles streaming behind. She followed, not really surprised.

Through bays and inlets of coral they swam, by algae-covered rocks and sea-moss like green waving hair and now and then a stray brown kelp anchored to the bottom with its top held near the surface by small bladders of gas. Purple, green, orange, solid or tenuous, the shallow-water plants decorated the reef. Starfish crowded near vase-like sponges, and beautiful but dangerous sea anemones perched on stones or the backs of crabs. Green spiked sea urchins and dark sand dollars dotted the bottom sand (where sand occurred), and green lobsters gestured with their terrible pincers. She had to swerve to avoid a giant ancient horseshoe crab. And the bivalves—they were everywhere!

She longed to stop and begin

painting—but then she would lose the guide, for that fast-jetting mollusc gave her no time to lag. Tragedy!

Then, abruptly, she faced it: a coiled ammonite shell over six feet in diameter. Her guide was gone, perhaps afraid for its own safety, and she was on her own.

The tremendous hood hoisted up, a gateway almost as tall as she was in that position. Yellow tentacles snaked out, writhing toward her. She was frightened now, but she stood her ground as well as her buoyancy permitted. An eye the size of a small saucer fixed on her.

"Yes?" the king of the ammonites said. No bubbles rose, for it was not an air-breather.

She didn't want to admit that its speech surprised her, so she asked it an inane question. "Are your sutures fluted?"

A hundred tentacles formed a frown. "Are they fluted, *what?*"

She blushed. "Are they fluted, *your majesty?*"

The frown writhed into neutrality. "Honeyshell," King Ammon said, "my sutures are royally fluted and convoluted, each in the shape of a finely crafted crown. Would you care to examine them from the inside?" Its purple tentacles were extending toward her, each a yard long, and its mouth pried itself open.

"No," she said quickly, backpedaling.

"One does not," Ammon remarked slowly, "say *no* to the King." Several of its red tentacles were coiling around projections in the coral reef, as though ready to pull the entire shell forward suddenly.

"I meant—" She cast about for the proper phraseology. "Your majesty, I meant that I could never think of doubting the statement of the king so it would be insulting to suggest any closer inspection, your majesty."

The tentacles relaxed while Ammon

considered. "There is that." Somehow she had the impression the king was disappointed. Now he was green.

"What I came to ask," she said humbly, "was why? Why do you need such a complex pattern, when no one can admire it . . . from the outside?"

"I can admire it very well from the inside—and my opinion is the only one that matters. And I am hungry."

"Hungry?" She didn't make the connection, unless this were a hint that she should get farther out of range. But the king surely could move through the water faster than she, and he had so many appendages! Brown, at the moment.

"I perceive you do not comprehend the way of the ammonite," Ammon remarked. "You vertebrates are powerful but clumsy. You have only four or five extremities, one or two colors, and your shell is obscure."

"We do our best to live with our handicaps," she said.

"Actually, you're decent enough, for a lower species," Ammon admitted graciously. "It behooves me to educate you. Pay attention: our primitive ancestors, the Nautilids, had simplistic septums, hardly more than dismal disks, and so their sutures were aconvolute. They scrounged and scavenged after a fashion, gobbling down anything they could catch, and doubtless made a living of sorts. But we ammonites learned the secret of specialization: by varying the size of the space between the torso and the outermost septum, the early ammonite was able to change his specific gravity. Larger air pocket (actually a unique gas—but you would not comprehend the secret formula), he floated; smaller, and he sank. Do you understand?"

"Oh, yes," she said. "That would be a big advantage in swimming, since you could maintain any level without effort."

"Hm." King Ammon did not seem to be

entirely pleased. "Just so. Now with a flat septum there is not much purchase, since the body is anchored only at the rim and the siphuncle. You know what the siphuncle is, of course?"

"No, sir," she said.

"Hm." The mollusc was pleased this time. "That is the cord of flesh that passes through the septa and chambers of the shell, right back to the very end. Have to keep in touch, you know. I suppose your tail is a clumsy effort in that direction. At any rate, a convoluted septum, matching the configuration of the body surface, is a more effective base for adjustment of the volume of that gaseous partition. So we ammonites have superior depth control. That enables us to feed more effectively, among other things."

"How clever!" Aquilon exclaimed. "I can see how you grew so large. But what do you eat?"

"Zilch, naturally. What else would a sapient species bother to consume?"

"I don't think we vertebrates are that advanced. I don't even know what zilch is."

Ammon's tentacles writhed and went rainbow at this astonishing confession of ignorance, but he refrained from remarking on it, courteously. "Call it a type of marine fungus. There are quite a number of varieties, and naturally each ammonite species specializes on one. I imbibe nothing less than Royal Zilch, for example. No other creature can feed thereon!"

"By kingly decree?" She had not realized that ammonites were so finicky.

"By no means, though it is an interesting thought. No lesser creature has the physical capability to capture a Royal Zilch, let alone to assimilate it. It is necessary to lock on to its depth and duplicate its evasive course precisely, or all is lost. One mistake, and the zilch eats *you*."

Oh. "That's why your convolutions are so

important. Your hunting is dangerous."

"Yes. I can, among other feats, navigate to an accuracy of two millimeters, plus or minus fifteen per cent, while interpenetrating the zilch with seventy-three tentacles." Gray members waved proudly. "And I've seldom been slashed."

This was beginning to sound like doubletalk to Aquilon. But she remained entirely too close to the king to risk contradicting him directly. He might yet develop an appetite for bipedal vertebrate a la blonde. "I'm amazed you can coordinate so well."

"Your amazement is entirely proper, my dear. You, with your mere five or six appendages, can hardly appreciate the magnitude of the task. And every unit has to be under specific control. The nervous system this entails—you know what a brain is?"

"I think so."

"Hm. Well, I have a sizeable brain. As a matter of fact, the convolutions of my septa merely reflect the configuration of the surface lobes of my brain, which are naturally housed deep within my shell for proper protection. It is my advanced brain that sets me off from all other species; nothing like it exists elsewhere, nothing ever has, nothing ever will. That is why I am King."

Aquilon searched for some suitable comment.

Suddenly Ammon turned orange and lifted grandly in the water. She had supposed him bottom-bound because of his size, but he moved with exactly the control he had claimed, smoothly and powerfully. "There's one!"

She peered about anxiously. "One what?"

"One Royal Zilch. My meal!" And the king jetted off.

Now she saw his prey, a flat gray shape.

"No!" she cried with sudden horror. "That's Circe!"

But the chase was already on, the monster cephalopod shooting backwards in pursuit of the fleeing manta. She knew how helpless the mantas were in water, and foresaw only one outcome of this chase. "No!" she cried again, desperately, but the bubbles merely rose upward from her mouth, carrying her protest snared within them.

She woke with a mouthful of sea water, her body soaking and shivering, and she still felt sick. She clambered out into the chill breeze. It was four A.M., or close enough, and time for her shift on watch to begin. *

Veg had the four-to-eight sleep, and she didn't envy him his attempt in the watery cabin. The mantas wisely remained on the roof, seemingly oblivious to the continual spray. A gentle phosphorescence showed the outlines of the rolling waves, and the wind continued unabated. Now that she was fully awake and erect, she found the chill night breeze refreshing.

There was not much to do. Veg had lashed the rudder and cut the sail to a quarter spread, and the Nacre was stable. They had merely to remain alert and act quickly if anything untoward happened. She did not expect to see more than routine waves, however.

"Cal," she ventured, oddly reminded of a time on Nacre-planet when she had been alone with him in adversity.

"Yes, 'Quilon," he said immediately. He did not sound tired, though he could not have had any better rest than she had had, during his turn in the cabin. This was a rough vigil for him. The fact that he was able to bear up at all meant that he had gained strength considerably since Nacre. That was reassuring.

"The ammonites—could they have been intelligent?"

She was afraid as she said it that he would laugh; but he was silent for a time, considering it. She waited for him, feeling the damp air in her hair, the vibrations of the shifting logs underfoot. No, Cal was not the one to laugh at a foolish question; he always took in the larger framework, the reason behind the statement.

"Highly unlikely, if you mean in any advanced manner. They had neither the size nor the metabolism to support extensive brain tissue, and water is a poor environment for intellectual activity. It —"

"I mean—the big ones. As big as us."

"Most ammonites were quite small, by human standards. But yes, in the late Mesozoic some did achieve considerable size. I believe the largest had a shell six and a half feet in diameter. However—"

"That's the one!"

He glanced toward her in the dark; she could tell by the changing sound of his voice. "Actually, we know very little about their biology or life habits. The soft parts are not ordinarily preserved in fossils, and even if they were, there would be doubt about such things as color and temperament. But still, there are considerable objections to your thesis."

"In short, no," she said, smiling. She liked to smile, even when no one could see; it was a talent she had not always had. "Try this: could they have eaten a kind of swimming fungus exclusively, and become extinct when it disappeared?"

"One would then have to explain the abrupt extinction of the fungus," he pointed out.

"Maybe it emigrated to Nacre . . ." But this was another dead end. It had been quite convincing in her dream, but it lacked that conviction here. The mystery remained, nagging her: why had so highly successful a subclass as the Ammonoidea, virtually rulers of the sea during the Cretaceous period,

become abruptly extinct? Survived only by its far more primitive relative, the pearly nautilus . . .

"What, if I may inquire into such a personal matter, brought the status of the cephalopods to mind? I had understood these were not of paramount interest to you."

"You showed me those shells and explained, and I—had a dream," she said. "A foolish, waterlogged vision . . . if you care to listen."

"Oh, I have enormous respect for dreams," he said, surprising her. "Their primary purpose is to sort, assess and file the accumulated experience of the preceding few hours. Without them we would soon all be thoroughly psychotic, particularly on so-called contemporary Earth. Adapting to this Paleocene framework is difficult, but have you noticed how much less wearing it is intellectually than was merely *existing* on Earth? So it is not surprising that your dreams reflect the change. They are reaching out into the unbounded, as your mind responds to this release."

The odd thing was that he was right. She had longed to return to Nacre, because of the relief it offered from the tensions of home—but this world served the purpose just as well. She would rather be battered, seasick and in fear for her life *here*, than safe and comfortable *there*.

But it was not entirely the freedom from Earth that was responsible, she knew. Cal, Veg, the mantas—she loved them all, and they all loved her, and Earth had nothing to match that.

She told Cal in detail about colorful King Ammon, and both laughed and it was good, and her sea-sickness dissipated.

At eight, daylight over the water, Veg came up to relieve Cal. "Do snails have false teeth?" he inquired groggily. "I had this dream—"

Direct sunlight hustled the mantas back inside the cabin, the solar radiation too hard on them. There had been tree-shade on the island, and irregular cloud cover; apart from that they tended toward the night. It was not that they were naturally nocturnal; but high noon on the planet Nacre was solid fog, and the beam of the sun never touched their skins. These four were more resistant to hard light than were their kin on Nacre, for they had been raised on Earth—but environment could modify their heredity only so much. They could survive sunlight here, but not comfortably and not long.

The day swept on, the wind abating only momentarily. Her heart pounded pusillanimously during such hesitations, anticipating the consequence of a prolonged delay in mid-ocean. What use would land within a hundred miles be, if they had to *row* the clumsy craft there? And should the wind shift . . .

At dusk, windchapped and tired, they watched the mantas come out and glide over the water, their pumping feet invisible as they moved at speed. How clearly this illustrated the fact that mantas did not perambulate or fly or swim! They jumped, and their flat bodies braced against the air in the manner of a kite or airplane wing, providing control. They either sat still and lumplike, or traveled at thirty to a hundred miles per hour; they could not "walk." They were beautiful.

And they were hungry. Circling near the raft, they lashed at surfacing fish. She heard the whip-snap of their tails striking water, and saw the spreading blood. Cal brought out a long-handled hook Aquilon hadn't known was aboard and hauled the carcasses in. He spread them on the deck, and one by one the mantas came in to feed. Circe first—and Aquilon watched her chip the fish up into small chunks with her deadly tail, then settle on top of the mess for

assimilation. Cal had placed a section of sail over the logs so that the fluids of this process would not be lost.

Veg did not watch, and neither, after a moment, did Aquilon. They all understood the necessity of feeding the mantas, and knew that the creatures could not digest anything but raw meat, and would not touch any but the flesh of omnivorous creatures—but this proximity was appalling. Circe had fed on rats in the theoretically aseptic far-cellar of Aquilon's Earth apartment building, and this had been accomplished privately. No doubt Hex had similarly isolated himself from Veg in the forest at feeding time. Now it was hard to accept physically what they had known intellectually. Only Cal seemed unaffected—and of course he had foreseen this problem too.

Aquilon called herself a hypocrite, but still did not watch. Perhaps it was because she knew herself to be a member of an omnivorous species—evolved to eat anything, and to kill wantonly. Whatever brutality was involved in the manta's existence, was redoubled for man's. What could she accomplish, deciding to stop eating flesh after indulging for a lifetime, and spawned from millions of years ancestry of flesh eaters? Years would be required to grow the tainted protoplasm out of her body, and the memory would never be expunged. Yet how could she kill, now that she comprehended the inherent evil of the action?

She felt sick again. Damn her subjectivity!

In five days they spotted land.

"There she blows!" Veg sang out happily.

"That's Land Ho!" Aquilon corrected him. "Fine lookout *you'd* make."

But she was immensely relieved, and knew the others were too. Diminished

appetites had extended their stores of food, but the men were looking lean and the limit had been coming distressingly near. Their camaraderie had never been tested by real hunger. Certainly it would have been ugly—a compulsive meat-eater, a vegetarian, and a woman wavering unprettily between, and nothing but fish . . .

But she was relieved because of the change in scenery, too. The sea, after the first day, had become monotonous; it had seemed as though they were sailing nowhere, accomplishing nothing.

The Nacre tacked clumsily along the shoreline, seeking an appropriate landing. Aquilon could not be certain whether it was mainland or merely a large island, but it was obviously suitable for foraging and camping. No smog.

"No really formidable land animals on Earth during the Paleocene epoch," Cal remarked, as though to reassure them.

"Good for Paleo," Veg said.

"Paleo?"

"Here. You want to call this world Epoch instead?"

Cal did not argue. Veg tended to identify things simply, and the names stuck. Henceforth this planet would be Paleo.

Soon a calm inlet opened, and Veg guided the craft so neatly into the cove that she knew it was blind luck. She watched for a suitable beach, wondering whether this was San Francisco Bay. Probably not; everything could have changed. Palms were in view, and conifers, and populous deciduous trees. Birds flitted through the branches, uttering harsh notes. Insects swarmed. Flowers of many types waved in the breeze.

"Look—fungus!" she exclaimed, spying a giant puffball. For a moment she thought of Nacre again, the planet of fungi. But Paleo, really, was better, for here the sun could

shine. In fact, she was coming to realize that Nacre itself had represented little more than an escape from Earth, for her; there was nothing inherently appealing about it otherwise, except for the mantas. And it was not the *planet* Earth that soured her, but the human culture that infested it. Yes, yes—Paleo was better.

The raft drifted close. The bottom of the bay was clear now, small fish hovering placidly. The smell of woods and earth came to her as the wind subsided, cut off by the land. The soil-loam-humus *cleanness* of it filled her with longing.

Veg touched her arm, and she looked up with a start.

Near the shore stood two hairy animals. They were four-footed, thickset and toothy, with long tails and blunt multiple-hoofed feet. Small tusks projected from their mouths, and their eyes were tiny. The overall aspect was like that of a hippopotamus—except that they were far too small. The highest point of the back was no more than a yard off the ground.

"Amblypods," Cal remarked without surprise. "*Coryphodon*, probably. Typical Paleocene fauna."

"Yeah, typical," Veg muttered. "You never saw it before, but you know all about it."

Cal smiled. "Merely a matter of a decent paleontological grounding. I don't really know very much, but I'm familiar with the general lines. The amblypods are distinctive. One of the later forms, *Uintatherium*, had the bulk of an elephant, with three pairs of horns on his—"

"You figure any of those are around here?"

"Of course not. *Uintatherium* was Eocene. He could no more show up in a Paleocene landscape than could a dinosaur."

Veg's eyes ranged over the forest. "I sure

would laugh if a dinosaur poked his head over the hill while you were saying that. You're too sure of yourself."

Cal smiled again, complacently. "When that happens, you'll certainly be entitled to your mirth. The shellfish I studied on the island were decisive."

Veg shook his head and guided the raft to shore. Aquilon noticed irrelevantly that his face was filling out with blond beard. The amblypods, startled by the intrusion, trotted off, soon to be lost in the forest.

Smoothly the Nacre glided in, cutting the gap to land to twenty feet, fifteen, ten—

And jarred to a halt, dumping Veg and Aquilon into the water. "Oops, struck bottom," Veg said sheepishly. "Wasn't thinking."

"Wasn't *thinking*," she exclaimed, cupping a splash of water at him violently. But she was so glad to touch solid land that she didn't care. The sea was hip-deep on her here, and she waded ashore gleefully, pulling strings of seaweed from her torso.

Veg, meanwhile, went back to fetch a rope and haul the craft about by hand. Cal, never careless about his footing, had held his place, and helped unwind the coil. Soon they had the raft hitched loosely to a mangrove trunk.

Aquilon wandered inland, content for the moment merely to absorb the sights and smells of this richly primitive world. Ferns grew thickly on the ground, and she recognized several species of bush and tree: sycamore, holly, persimmon, willow, poplar, magnolia. Mosses sprouted profusely, and mushrooms were common; but she saw no grass, to her surprise. Still, there had been bamboo on the island, and that was a form of grass.

Something launched itself from a shrub ahead, and she jumped in alarm. It was a brown streak that sailed through the air, away from her. She caught a glimpse of

extended limbs, a web of skin, an oblong shape. Then it was gone; she heard the rustle of its ascent in other foliage. It was not a bird.

"Planetetherium," Cal said behind her. "Primitive insectivore, one of the prime mammalian stocks. A glider."

"Yes . . ." she said, seeming to remember it from her studies. She really had no excuse to be ignorant of mammalian lines, but time and other considerations had let her knowledge fade. Cal, with his appalling intellect, seemed never to forget a thing.

"Perhaps you should change," Cal suggested, "before you become uncomfortable."

She looked down at herself. Her clothing was plastered against her body, and she knew the salt would chafe as the moisture evaporated. Cal was right, as always.

Yet the air was pleasant, and despite the shade of the trees there was no chill. She wished she could simply remove her clothes and glide nymphlike through glade and fern, free of all encumbrance.

"Why not?" she said rhetorically. She began to strip, handing her wet garments to Cal stage by stage. He made no comment, and did not avert his gaze. It was as though he had known it would come to this, and accepted it with equanimity.

So she ran, nymphlike, through glade and fern. It was every bit as glorious as she had imagined, except for a thorn that got in her foot. She had shed the restraints of civilization with her clothing, and was whole again.

Veg's mouth dropped open appreciatively as she burst upon him, but he said no more than Cal had.

The Nacre was tight against the shore: Veg's muscle had come into play. Her dry apparel was aboard, but she hesitated to seek it. Wouldn't it be better if they *all* were to—

No. She realized immediately that nudity was not that easy for the men. She was, she was aware, a handsome woman. Her body had an effect on the male, and neither Veg nor Cal would care to display that effect openly. And Cal was not a robust man, and would have no joy in exposure.

She boarded the raft and dressed. What good was a freedom her companions could not share?

They spent the night on the raft, anchored just offshore. There might be no dangerous species, but they preferred a little more time for acclimation.

In the morning the insects and birds were thick. The first were familiar, the second strange. Several large gray sea-fowl swam around the raft, diving for fish. Aquilon stood on the deck and painted them, intrigued by their fearlessness. Were there no significant predators on the water? Or was the raft so unusual as to be taken for an artifact of nature? Or did they know instinctively who was a threat and who was not?

Veg brought the Nacre to shore again and tied up. This time there was no premature jolt. She wondered whether he had scouted the bottom to locate a suitable channel for the keel, or whether he had excavated one himself.

They ventured inland several miles, as a party. Here were oaks, beeches, walnuts, and squirrel-like creatures sporting in them. Occasional tufts of grass sprouted in the hilly country, where the thickly growing trees permitted. So it was present, but not well established. Ratlike creatures skittered away as the human party approached.

"Were there true rodents in the Paleocene?" Aquilon inquired.

"Not to speak of," Cal said. "These are probably ancestral primates."

"Primates!" She was shocked.

"Before the true rodents developed, the primitive primates occupied that niche. They descended from the trees, like most mammals, and took to the opening fields. But there wasn't enough grass, as you can see; it occupies a minor ecological niche until the Miocene epoch, when widespread dry plains developed. And the primates weren't completely committed. So the true rodents eventually drove them back into the trees, this time to stay. The primates never were very successful."

"Except for man . . ."

"A minor exception, paleontologically. Man happened to wobble back and forth between field and forest just enough to remain more generalized than most of his contemporaries. If he hadn't been lucky and clever, he would not have survived."

"I see." She wasn't certain how serious he was.

"Quite often it is the less specialized creature that pulls through," he continued blithely. "Conditions change, and the species fully adapted to a particular environment may have to change in a hurry or perish. Often it can't adapt. But the generalized species can jump either way. So although it seldom dominates, it may outlast those who do. Probably that explains the marginal success of the primitive nautilus, while the specialized and dominant ammonite vanished."

She had never thought of it quite that way. Man—as an unspecialized, lucky, but clever species, thrown into prominence by accident of circumstance . . .

A large running bird with yellow tailfeathers appeared and scooped up a careless mammal that resembled a kangaroo rat. The bird, a good two feet tall, passed quite close to them before passing out of sight. Aquilon wondered whether the rat could have been an ancestor of hers, then chided herself: dead, it could not have sired

much. At any rate, it would be foolish to interfere. Suicidally foolish, possibly, for *any* change in the life patterns here might affect those of her own time.

"The birds showed considerably more promise, initially," Cal said. "Actually, throughout the Cenozoic until the present, they have dominated Earth, reckoned in the normal manner."

"By number of species," she said. "So I understand. But diversity isn't everything, fortunately."

"Fortunately?"

"You don't approve of man winning out?"

"I believe the world would have endured more amicably without him. It is not good to have a single species run amuck."

She saw that he meant it. She thought of contemporary Earth, and understood his point. Paleo was clean, unspoiled. Better that it remain that way, paradox aside.

The next few days they ranged more widely. They encountered more amblypods, and both doglike and catlike carnivores. The pursuers, Cal explained, had long snouts for reaching out on the run; the hide-and-pouncers had sharp claws for holding and slashing, and short snouts. The ambushers buried their dung, to mute the giveaway odor; the chasers did not bother. The physical properties of what were later to be canines and felines and ursines were not random. Another line was the fairly substantial Dinocerata, ancestors to the monster Uintatherium of the later epoch. But all these mammals were stupid, compared to those that were to evolve; none would have survived readily on Earth of fifty million years later. She painted them all, and Cal made many notes on his voicetyper. She learned to ignore the monotonous murmur of his descriptions as he made his entries.

This was a warm paradise—but she became restless. There was nothing, really, to do. It had been nice to dream of a life without responsibility or danger or discomfort, but the actuality palled rapidly. It was late summer, and a number of the trees bore small fruit, and there were berries and edible tubers. Food was not a serious problem. She talked with Veg and Cal, but knew them both too well already, and she did not care to get too personal lest it come down abruptly to the male-female problem. She had not decided between them, yet; that was what restrained her, she decided.

"Going to get cold," Veg observed. "Fall's coming."

Of course he was right. They didn't know their exact location, and it probably could not be matched precisely to a modern-Earth geography anyway, but the number of deciduous trees said things about the seasons. There might be no actual snow here in winter, or there might be several feet of it—but it would be cold enough to make leaves turn and drop. They would have to prepare for the worst, or—"Let's go south!" she cried. "To the tropics, where it is warm all year round. Explore. Travel. Survey."

"You sound as though we're staying here indefinitely," Cal remarked, but there was something funny about the way he said it. *He's afraid of something*, she thought, and that made her uneasy. Was it that a long-term residence would force them to revert farther toward the natural state, mating and home-making? Or that doing so would upset the existing balance of nature and imperil the status-quo on Earth, because of the paradox effect? Her inclination was to ignore that; somehow she doubted that what they did *here* could affect Earth *there*, whatever the theory might be. And if it did—well, so be it.

"Actually, there appears to be more than

enough data on hand to render a report on Paleo," Cal continued.

She felt the skin along her forearms tightening—a nervous reaction once more common than now. She *had* forgotten, or tried to forget, their assigned mission. The truth was that she viewed the prospective return to Earth, or whatever other mission awaited next, with misgivings bordering on alarm. She liked Paleo, bored though she had been with it a moment ago. She liked its wildness—"In wildness is the preservation of the world," she remembered from somewhere—and she would far rather tackle its problems than those of Earth society.

But they had little pretense to dally longer. The onset of winter could be of little concern to them if they were to return to the station and report. Their radio equipment was in good order, and they could find the way by homing in on the master unit remaining in the tunnel.

But she was sure, now, that Cal did not want to go back, though she also knew it would be useless to challenge him on that. He comprehended something she did not, something that worried him deeply, but that he chose to keep to himself. He might allow himself to be persuaded to travel south—or somewhere, anywhere but back—if she could provide a strong enough pretext.

Yet she did not care to admit her true feelings yet. How did Veg stand?

"Can't sail back against the wind," Veg said. "More likely sink, tacking the whole way, and it'd take us a month in clear weather. Going to get hungry on the way."

Bless him! She felt a surge of special affection for the big, simple man, so naive in manner but practical in action. They *couldn't* go back without enormous preparation.

"Of course," Cal said, unperturbed. "I

was thinking of a radio report. We can not make a physical return until the wind shifts with the season—though that may occur any day now."

That did not reassure her particularly, though she wasn't sure why. Cal seemed to be agreeing to some dalliance, and a radio report would keep them officially on duty.

"I thought your report came at the end," Veg said.

"Not necessarily. We were to determine the status of the planet, then put the report on record for the next in-phase connection to Earth. It was presumed that these various delays would make the report wait for a month or two, perhaps longer. But we've done the job. This is definitely Paleocene. All the fauna and flora check. We have exceeded coincidence by a millionfold; this can not be a foreign planet."

"How about the geography?"

"I explained about that. Their map seems accurate, and it is—"

"We could follow the coast a little and find out, maybe," Veg said. "Make sure there isn't some out-of-place continent, or something."

Clumsy, clumsy, she thought. That tack would never work.

Cal smiled ruefully. "In other words, you're voting with 'Quilon again.'"

Was he *asking* to be outvoted? What was on his mind?

Veg shrugged, missing the implication. "There's time to kill, and maybe we'll learn something new for your report. Better than sitting around here waiting for the wind."

"That's a transparent appeal to the researcher in me," Cal said. "You know I don't like to make a premature statement, and so long as the possibility exists of discovering something significant—" He sighed. "All right. I know how the mantas feel. They all want to remain here indefinitely. So a full vote would change

nothing. We'll leave one of the two radios here under cover and mark the place. That way, if anything happens to the raft, I'll still be able to make my report."

Aquilon smiled uneasily. Cal had yielded almost too readily.

They sailed by day, tacking along the shore and covering about twenty miles before searching out a harbor for the night. It was good to be moving again, even though there was now no tangible destination.

A month passed like the breath of the breeze, and it was good. Gradually the curve of the continent brought them around so that they were sailing south-south-east and largely before the shifting wind. They had come perhaps eight hundred miles, and only verified that the Paleocene landscape was remarkably uniform, though she realized that this could be because their progress south roughly matched that of the coming fall season.

The mantas rode the raft the first few days, then took to traveling on land. They would disappear in the morning and reappear at the new camp in the evening. Sometimes only one or two would show up, the others ranging elsewhere for days at a time. Yes, they liked Paleo!

It was Circe who broke the lull, bringing news to Aquilon just before dusk. "Mountains? Tall ones?" Aquilon inquired, reading the manta's responses so readily now that it was almost the same as human dialogue. "Unusual? Snow-capped? And—"

She spoke to the others, excitedly. "It seems there are extremely large mountains about two hundred miles south of us. Twenty thousand feet, or more. They form a virtually solid wall, and a number are actively volcanic. The mantas can't get past, on land, because of the cold, and they don't

trust the water route either."

"How can an active volcano have snow on it?" Veg demanded. "It's hot, isn't it—or else the snow would put it out."

"Silly! Volcanoes aren't on fire," she reproved him. "One could shoot off in a snowstorm—or underwater, as many do." But she was thrilled. They were finally coming up to something atypical, something not suggested by the map or Cal's knowledge of Paleocene geography. Massive, active volcanoes, shoulder to shoulder, in America.

The mantas had been ranging far ahead, scouting the territory, yet had been balked by these, both on land and water. A mighty barrier indeed, for the manta's traveling range was good.

"If that's the region the tsunami originated from," Cal said, "we had better approach it with exceeding caution."

Aquilon nodded soberly, but she was singing inside. This promised to be an unforgettable experience—and that, despite all the undertones, was a thing she ardently craved.

Chapter 9: Orn

THE MOUNTAINS were high, and chill winds swept through the pass. The range was new; Orn's memory of the landscape of this tropical section of the subcontinent indicated a flat plain sometimes submerged by an inlet of the ocean. Natural forces had come into play in unusual fashion to bring this orogeny where none had occurred before. Yet it was possible that his mental map was inaccurate, for this was at the fringe of it. None of his ancestors had gone far beyond this place, having been stopped by the sea.

The range, and whatever land might lie beyond it, must have risen completely out of that ocean in the past few million years.

Orn would have turned back and sought another route, but it had been a long, difficult climb, game was scarce, and he was hungry. Prey might be near ahead; it certainly was not near behind. He ran on, generating new warmth to replace what the wind tore from him. If the lie of this pass were typical, the descent would begin soon.

It did. As Orn passed the ridge, the weather changed. The cold dry air became cold damp air that steadily warmed as he went lower. The stinging snow became ice-mist, then rain.

He adjusted his wings to shed as much water as possible in their oil-starved state and went on. He wanted to reach the lowlands by nightfall, and fill his crop. The vegetation was increasing, but the ferns and palmetto bore no fruit.

It was getting warm. Orn recognized the type of soil underfoot: volcanic in origin. This alerted him; he knew first hand, and many times over, how dangerous volcanism was. Instead of getting out of it, he was going deeper in.

There seemed to be more regions of such activity than ever in the past, and had his mind worked that way Orn would have wondered what the world was coming to. Great changes were taking place all over the land mass, apart from the revisions of plant and animal life. It continued to be unsettling.

He came across a streamlet, and followed it down rapidly. Dusk was coming. Just as it became almost too dark to forage by sight, he found a shallow pond stocked with fat lazy fish, teleos. He jumped in with both feet and scooped two out before they took alarm.

He fed well and spent the night in a dense mag tree. The hazard of the mountain

range had been overcome.

In the clear morning Orn looked out over the landscape. The stream fell away in a series of rapids and finally disappeared in a tangled mass of vegetation at the foot of the slope. A short distance beyond that lay the shore of a wide shallow lake. Many thickly overgrown islands spotted it, and portions were little more than liquid swamp. Far in the distance across that water rose another ridge of mountains.

The valley was hot. Jets of steam plumed from the bay nearest the live volcanoes and thick mists hung over much of the lake.

The valley was flat. Nothing stood taller than the height of the trees, and the majority of it was open water. It was, on the whole, familiar: this was the landscape of twenty million years ago, sharpest in his memory, though in greatly reduced scale.

He followed the stream down. Rushes and horsetails grew at the edges of its shallows, and leafed plants bordered it everywhere. Tufts of grass were present high on the mountainside, but disappeared in the lowland, unable to compete there. Orn did not miss it; grass was tough and tasteless stuff and its seeds were too small for his appetite.

As the land leveled out, Orn lost sight of the overall valley. He discovered that it was not as flat as it had seemed from above; mist had filled in irregularities, concealing banks and gulleys and gorges. The stream plunged into a mass of tall trees. A few were of the seasonal leaf-dropping variety that had taken over the continent to the north, but most were the memory-familiar ginks and firs. Here full-sized fern-trees prospered, and many tree-like varieties of cycad.

Game was especially plentiful. The little primes peeked out from the branches of the larger leafed trees and liz were abundant on the turf. Flying arths hummed everywhere.

He cut away from the river that was degenerating into swamp, and shortly came out on a bushy plateau punctuated by short barrel-bodied cycads and shrublike angios. Moss covered the occasional rocks. He trotted after a particularly large four-winged drag, not with any real hope of catching it but content to explore this wonderful, unexpected reincarnation of familiarity. Any pretext would do.

A huge, low shape rose before him. Orn was almost upon it before he was aware, having allowed pursuit of the winger to take up more of his attention than was wise. He had become careless, in this season of innocuous animals. He had smelled no large mam, so had relaxed. Foolishly.

It was a rep—a big one. It was not as tall as Orn, but that was because this creature's whole body was spread out against the ground. Its head was low and armored with bony scales, and four toothlike horns projected sidewise. Similar scales extended the length of the body, making the back a broad impervious trunk. Stout spikes lined each side, some as long as Orn's beak and as wickedly curved. The tail was a blunt, solid mass of bone.

Orn remembered immediately. This was an anky, one of the lines of great reps. It was four times his own length and disproportionately heavy and powerful, but no aggressive threat to him. Its massive armor was defensive, and it was a herbivore.

This was the second giant land rep he had seen here. The first had been in the cavern, mysteriously dead, but this one was healthy. Orn did not concern himself with the complex ramifications of his discovery, but did understand that where there was one live monster there were likely to be more. His relaxing reflexes were brought once more to full functioning, and he looked around alertly and somewhat furtively.

The anky, slow-witted, became aware of

him, and flexed its tail. Orn leaped back. A single sweep of that bludgeon could destroy him, were he so careless as to step within its range. The anky was harmless—but normal precautions had to be taken. It could kill without meaning to.

The anky took a slow step forward, the muscles in its short thick legs making the scales bulge outward. It was curious about him, in its dull way. He could easily outrun it, but preferred not to. Guided by a memory functioning for the first time the way it should, Orn stood still. The anky hesitated, then lost interest and took another mouthful of leaves from the nearest shrub. What did not move and did not smell threatening did not exist as a danger, to it. Anky had forgotten him.

Orn moved on, alarming the rep again. This time he was not concerned; he had verified the reliability of his memory, and would trust it within this valley. The sun was high now; the mists had cleared and the brush ahead thinned out into a field of low ferns.

A herd of large animals came into view, grazing peacefully. Orn recognized these too: tricers. Larger than the ones his ancestors had known, more horny—but also harmless, for him, when undisturbed.

He approached them cautiously, but they took no notice of him. Nearest was a large bull: as long as the anky, but taller than Orn, with a monstrous shield projecting from the back of the head. Three heavy-duty horns curved slightly downward from the region of eyes and nose, and mighty muscles flexed as it swung its head about. This was an animal no sensible creature tampered with.

Orn skirted the herd of fifty or more individuals and traveled on toward the main lake. The turf became spongy and the horsetails tall. And, significantly, the small birds became silent.

A head appeared above the mixed foliage. Orn jumped, spreading his wings in a reflex that had nothing to do with flying. He recognized this rep, too—and now he was in for trouble. This was a struth.

The struth was about Orn's own height, and rather similar in physique at first glance. It stood on long slender hind legs, and its small head topped a sinuous neck. It was omnivorous, but did not attack large prey. Its diet consisted of arths, aves, mams and anything else that offered, such as eggs or fruit. It was fleet.

The resemblance to Orn ended about there, for the struth had small forelimbs in lieu of wings, a strong fleshy tail in place of Orn's tuft of feathers, a mottled smooth skin and a much uglier beak. Its body, like that of any rep, varied in temperature with the heat of the day.

But its similarities to Orn were enough to constitute a problem, for the two shared, to a considerable extent, an ecological niche. They were direct competitors.

Orn had never physically encountered a struth before, but his memory covered all of this. The rep, possessing some faint hint of the species recollection so highly developed in Orn, knew it instinctively. They were not enemies in the sense of predator/prey, but the one could not tolerate the other in his foraging ground. The rival for food had to be driven off.

The struth, despite the similarity in size, outmassed Orn considerably, for it had fat and muscle where he had down and quill. It was fresh, while he was lean from the difficult trek over wasteland and mountain. In the chill of night or height, Orn would have contested with it nevertheless, for his warm body did not become lethargic as the temperature dropped. His reactions there would be faster, his blows surer, his perceptions more accurate.

But this was the heat of the day, and of

the lowland, and the rep was at its best in its home territory. Orn, in these circumstances, would be foolish to fight it now.

The struth was aware of its advantage. It charged.

Neither bravery nor cowardice were concepts in Orn's lexicon. He battled when it behooved him to, and avoided trouble at other times. He fled.

The struth had routed its rival—but was not bright enough to realize it yet. The chase, once commenced, had to continue until it terminated forcefully in some fashion.

Orn was a swift runner, as he had to be as a land-bound bird. But the terrain was new to him in detail, and the somewhat marshy ground was poor footing for his claws. He started with a fair lead, but the rep was gaining. This pursuit might be pointless for it—but it could also be fatal for *him*.

Orn dodged to the side, seeking to avoid the tricer herd. The struth cut across the angle, narrowing the gap between them rapidly. Only five body-lengths separated them now.

It would be useless to seek out the water and wade into it; the rep would merely follow, making better progress through that medium because of its solidity. Orn could swim on the surface, as the struth could not—but deep water was dangerous for other reasons. He would need time to scout it out thoroughly before trusting himself to it, regardless of the chase.

The ground became mucky, inhibiting him more. The wet sand and clinging mud encumbered his feet, slowing him down critically and tiring him too rapidly. It interfered with the struth too, but not as much. The gap was down to three body-lengths.

Orn ran on, not exhausted but straining to his utmost. Soon he would have to stand and fight—and unless he were unrealistically

(CONTINUED ON PAGE 128)

Bob Shaw is one of those quiet Irishmen who seems able to see the human side of every scientific problem, whether it is 'slow glass' and the sights it may preserve for a widowed man of his wife ("Light of Other Days"), or, in this case, the impact upon a man and his wife of an—

INVASION OF PRIVACY

BOB SHAW

Illustrated by **MICHAEL HINGE**

"**I** SAW GRANNY CUMMINS again today," Sammy said through a mouthful of turnip and potato.

May's fork clattered into her plate. She turned her head away, and I could see there were tears in her eyes. In my opinion she had always been much too deeply attached to her mother, but this time I could sympathize with her—there was something about the way the kid had said it.

"Listen to me, Sammy." I leaned across the table and gripped his shoulder. "The next time you make a dumb remark like that I'll paddle your backside good and hard. It wasn't funny."

He gazed at me with all the bland defiance a seven-year-old can muster. "I wasn't trying to be funny. I saw her."

"Your granny's been dead for two weeks," I snapped, exasperated both at him and at May, who was letting the incident get too far under her skin. Her lips had begun to tremble.

"Two weeks," Sammy repeated, savoring the words. He had just discovered sarcasm and I could tell by his eyes he was about to try some on. "If she'd only been dead two days it woulda been all right, I suppose. But

not two weeks, huh?" He rammed a huge blob of creamed potato into his mouth with a flourish.

"George!" May's brown eyes were spilling as she looked at me and the copper strands of her hair quivered with anger. "Do something to that *child*! Make him drop dead."

"I can't smack him for that, hon," I said reasonably. "The kid was only being logical. Remember in 'Decline and Fall' where a saint got her head chopped off, then was supposed to get up and walk a mile or so to the burial ground, and religious writers made a great fuss about the distance she'd covered, and Gibbon said in a case like that the distance wasn't the big thing—it was the taking of the first step? Well . . ." I broke off as May fled from the table and ran upstairs. The red sunlight of an October evening glowed on her empty chair, and Sammy continued eating.

"See what you've done?" I rapped his blond head with my knuckles, but not sharply enough to hurt. "I'm letting you off this time—for the *last* time—but I can't let you go on upsetting your mother with a stupid joke. Now cut it out."

Sammy addressed the remains of his

dinner. "I wasn't joking I . . . saw . . . Granny . . . Cummins."

"She's been dead and buried for . . ." I almost said two weeks again, but stopped as an expectant look appeared on his face. He was quite capable of reproducing the same sarcasm word for word. "How do you explain that?"

"Me?" A studied look of surprise. "I can't explain it. I'm just telling you what I seen."

"All right—where did you see her?"

"In the old Guthrie place, of course."

Of course, I thought with a thrill of something like nostalgia. *Where else?* Every town, every district in every city, has its equivalent of the old Guthrie place. To find it, you simply stop any small boy and ask him if he knows of a haunted house where grisly murders are committed on a weekly schedule and vampires issue forth at night. I sometimes think that if no suitable building existed already—the community of children would create one to answer a dark longing in their collective mind.

But the building is always there—a big, empty, ramshackle house, usually screened by near-black evergreens, never put up for sale, never pulled down, always possessing a magical immunity to property developers. And in the small town where I live the old Guthrie house was the one which filled the bill. I hadn't really thought about it since childhood, but it looked just the same as ever—dark, shabby and forbidding—and I should have known it would have the same associations for another generation of kids. At the mention of the house Sammy had become solemn and I almost laughed aloud as I saw myself, a quarter of a century younger, in his face.

"How could you have seen anything in there?" I decided to play along a little further as long as May was out of earshot. "It's too far from the road."

"I climbed through the fence."

"Who was with you?"



"Nobody."

"You went in alone?"

"Course I did." Sammy tilted his head proudly and I recalled that as a seven-year-old nothing in the world would have induced me to approach that house, even in company. I looked at my son with a new respect, and the first illogical stirrings of alarm.

"I don't want you hanging around that old place, Sammy—it could be dangerous."

"It isn't dangerous." He was scornful. "They just sit there in big chairs, and never move."

"I meant you could fall or . . . What?"

"The old people just sit there." Sammy pushed his empty plate away. "They'd never catch me in a hundred years even if they seen me, but I don't let them see me, cause I just take one quick look through the back window and get out of there."

"You mean there are people living in the Guthrie place?"

"Old people. Lots of them. They just sit there in big chairs."

I hadn't heard anything about the house being occupied, but I began to guess what had been going on. It was big enough for conversion to a private home for old people—and to a child one silver-haired old lady could look very much like another. Perhaps Sammy preferred to believe his grandmother had moved away rather than accept the idea that she was dead and buried beneath the ground in a box.

"Then you were trespassing as well as risking . . ." I lowered my voice to a whisper as May's footsteps sounded on the stairs again. "You didn't see your Granny Cummins, you're not to go near the old Guthrie place again, and you're not to upset your mother. Got that?"

Sammy nodded, but his lips were moving silently and I knew he was repeating his original statement over and over to himself.

Any anger I felt was lost in a tide of affection—my entire life had been one of compromise and equivocation, and it was with gratitude I had discovered that my son had been born with enough will and sheer character for the two of us.

May came back into the room and sat down, her face wearing a slightly shamefaced expression behind the gold sequins of its freckles. "I took a tranquilizer."

"Oh? I thought you were out of them."

"I was, but Doctor Pitman stopped by this afternoon and he let me have some more."

"Did you call him?"

"No—he was in the neighborhood and he looked in just to see how I was. He's been very good since . . . since . . ."

"Since your mother died—you've got to get used to the idea, May."

She nodded silently and began to gather up the dinner plates. Her own food had scarcely been touched.

"Mom?" Sammy tugged her sleeve. I tensed, waiting for him to start it all over again, but he had other things on his mind. His normally ruddy cheeks were pale as tallow and his forehead was beaded with perspiration. I darted from my chair barely in time to catch him as he fell sideways to the floor.

II.

BOB PITMAN had been a white-haired, apple-cheeked old gentleman when he was steering me through boyhood illnesses, and he appeared not to have aged any further in the interim. He lived alone in an unfashionably large house, still wore a conservative dark suit with a watch-chain's gold parabola spanning the vest, played chess as much as possible and drank specially-imported non-blended Scotch.

The sight of his square hands, with their ridged and slab-like fingernails, moving over Sammy's sleeping figure comforted me even before he stood up and folded the stethoscope.

"The boy has eaten something he shouldn't," he said, drawing the covers up to Sammy's chin.

"But he'll be all right?" May and I spoke simultaneously.

"Right as rain."

"Thank God," May said and sat down very suddenly. I knew she had been thinking about her mother and wondering if we were going to lose Sammy with as little warning.

"You'd better get some rest." Dr. Pitman looked at her with kindly severity. "Young Sammy here will sleep all night, and you should follow his example. Take another of those caps I gave you this morning."

I'd forgotten about his earlier visit. "We seem to be monopolizing your time today, Doctor."

"Just think of it as providing me with a little employment—everybody's far too healthy these days." He shepherded us out of Sammy's room. "I'll call again in the morning."

May wasn't quite satisfied—she was scrupulously hygienic in the kitchen and the idea that our boy had food poisoning was particularly unacceptable to her. "But what could Sammy have eaten, Doctor? We've had everything he's had and we're all right."

"It's hard to say. When he brought up his dinner did you notice anything else there? Berries? Exotic candies?"

"No. Nothing like that," I said, "but they wouldn't always be obvious, would they?" I put my arm around May's shoulders and tried to force her to relax. She was rigid with tension and it came to me that if Sammy ever were to contract a fatal illness or be

killed in an accident it would destroy her. We of the Twentieth Century have abandoned the practice of holding something in reserve when we love our children, assuming—as our ancestors would never have dared to do—that they will reach adulthood as a matter of course.

The doctor—nodding and smiling and wheezing—exuded reassurance for a couple more minutes before he left. When I took May to bed she huddled in the crook of my left arm, lonely in spite of our intimacy, and it was a long time before I was able to soothe her to sleep.

In spite of her difficulty in getting to sleep, or perhaps because of it, May failed to waken when I slipped out of the bed early next morning. I went into Sammy's room, and knew immediately that something was wrong. His breathing was noisy and rapid as that of a pup which has been running. I went to the bed. He was unconscious, mouth wide open in the ghastly breathing, and his forehead hotter than I would have believed it possible for a human's to be.

Fear spurted coldly in my guts as I turned and ran for the phone. I dialed Dr. Pitman's number. While it was ringing I debated shouting upstairs to waken May, but far from being able to help Sammy she would probably have become hysterical. I decided to let her sleep as long as possible. After a seemingly interminable wait the phone clicked.

"Dr. Pitman speaking." The voice was sleepy.

"This is George Ferguson. Sammy's very ill. Can you get over here right away?" I babbled a description of the symptoms.

"I'll be right there." The sleepiness had left his voice. I hung up, opened the front door wide so that the doctor could come straight in, then went back upstairs and waited beside the bed. Sammy's hair was

plastered to his forehead and his every breath was accompanied by harsh metallic clicks in his throat. My mind became an anvil for the hammer blows of the passing seconds. Bleak eons went by before I heard Dr. Pitman's footsteps on the stair.

He came into the room, looking uncharacteristically disheveled, took one look at Sammy and lifted him in his arms in a cocoon of bedding.

"Pneumonia," he said tersely. "The boy will have to be hospitalized immediately."

Somehow I managed to speak. "Pneumonia! But you said he'd eater something."

"There's no connection between this and what was wrong yesterday. There's a lightning pneumonia on the move across the country."

"Oh. Shall I ring for an ambulance?"

"No. I'll drive him to the clinic myself. The streets are clear at this hour of the morning and we'll make better time." He carried Sammy towards the door with surprising ease.

"Wait. I'm coming with you."

"You could help more by phoning the clinic and alerting them, George. Where's your wife?"

"Still asleep—she doesn't know." I had almost forgotten about May.

He raised his eyebrows, paused briefly on the landing. "Ring the clinic first, tell them I'm coming, then waken your wife. Don't let her get too worried, and don't get too tensed up yourself—I've an emergency oxygen kit in the car, and Sammy should be all right once we get him into an intensive care unit."

I nodded gratefully, watching my son's blindly lolling face as he was carried down the stairs, then went to the phone and called the clinic. The people I spoke to sounded both efficient and sympathetic, and it was only a matter of seconds before I was

sprinting upstairs to waken May. She was sitting on the edge of the bed as I entered the room.

"George?" Her voice was cautious. "What's happening?"

"Sammy has pneumonia. Dr. Pitman's driving him to the clinic now, and he's going to be well taken care of." I was getting dressed as I spoke, praying she would be able to take the news with some semblance of calm. She stood up quietly and began to put on clothes, moving with mechanical exactitude, and when I glimpsed her eyes I suddenly realized it would have been better had she screamed or thrown a fit. We went down to the car, shivering in the thick gray air of the October morning, and drove towards the clinic. At the end of the street I remembered I had left the front door of the house open, but didn't turn back. I think I'd done it deliberately, hoping—with a quasi-religious irrationality—that we might be robbed and thus appease the Fates, diverting their attention from Sammy. There was little traffic on the roads but I drove at moderate speed, aware that I had virtually no powers of concentration for anything extraneous to the domestic tragedy. May sat beside me and gazed out the windows with the air of a child reluctantly returning from a long vacation.

It was with a sense of surprise that, on turning into the clinic grounds, I saw Dr. Pitman's blue Buick sliding to a halt under the canopy of the main entrance. In my estimation he should have been a good ten minutes ahead of us. May's fingers clawed into my thigh as she saw the white bundle being lifted out and carried into the building by a male nurse. I parked close to the entrance, heedless of painted notices telling me the space was for doctors only, and we ran into the dimness of the reception hall. There was no sign of Sammy, but Dr.

Pitman was waiting for us.

"You just got here," I accused. "What held you up?"

"Be calm, George. Getting into a panic won't help things in the least." He urged us towards a row of empty chairs. "Nothing held me back—I was driving with one hand and feeding your boy oxygen with the other."

"I'm sorry, it's just . . . How is he?"

"Still breathing, and that's the main thing. Pneumonia's never to be taken lightly—especially this twelve-hour variety we've been getting lately—but there's every reason for confidence."

May stirred slightly at that—I think she had been expecting to hear the worst—but I had a conviction Dr. Pitman was merely trying to let us down as gently as he could. He had always had an uncompromisingly level stare, but now his gaze kept sliding away from mine. We waited a long time for news of Sammy's condition, and on the few occasions when I caught Dr. Pitman looking directly at me his eyes were strangely like those of a man in torment.

I thought, too, that he was relieved when one of the doctors on the staff of the clinic used all his authority to persuade May it would be much better for everybody if she waited at home.

III.

THE HOUSE WAS LONELY that evening. May had refused sedation and was sitting with the telephone, nursing it in her lap, as though it might at any minute speak with Sammy's own voice. I made sandwiches and coffee but she wouldn't eat, and this somehow made it impossible for me to take anything. Tiny particles of darkness came drifting at dusk, gathering in all the corners and passageways of the house, and I finally realised I would have, to get out

under the sky. May nodded abstractedly when I told her I was going for a short walk. I switched on all the lights in the lounge before leaving, but when I looked back from the sidewalk she had turned them off again.

Go ahead, I raged. Sit in the darkness—a lot of good that will do him.

My anger subsided when I remembered that May was at least clinging to hope; whereas I had resigned myself, betraying my own son by not daring to believe he would recover in case I'd be hurt once more. I walked quickly but aimlessly, trying to think practical thoughts about how long I'd be absent from the drafting office where I worked, and if the contract I was part way through could be taken over by another man. But instead I kept seeing my boy's face, and at times sobbed aloud to the uncomprehending quietness of suburban avenues.

I don't know what took me in the direction of the old Guthrie place—perhaps some association between it and dark forces threatening Sammy—but there it was, looming up at the end of a short cul-de-sac, looking exactly as it had done when I was at school. The stray fingers of light reaching it from the road showed boarded-up windows, sagging gutters and unpainted boards which were silver-gray from exposure. I examined the building soberly, feeling echoes of the childhood dread it had once inspired. My theory about it having been renovated and put to use had been wrong, I realized—I'd been a victim of Sammy's hyperactive imagination and mischievousness.

I was turning away when I noticed fresh car tracks in the gravel of the leaf-strewn drive leading up to the house. Nothing very odd about that, I thought. Curiosity could lead anybody to drive up to the old pile for a closer look, and yet . . .

Suddenly I could see apples in a tree at the rear of the house.

The fruit appeared as blobs of yellowish luminescence in the tree's black silhouette, and I stared at them for several seconds wondering why the sight should fill me with unease. Then the answer came. At that distance from the street lights the apples should have been invisible, but they were glowing like dim fairy lanterns—which meant they were being illuminated from another, nearer source. This simple application of the inverse square law led me to the astonishing conclusion that there was a lighted window at the back of the Guthrie house.

On the instant, I was a small boy again. I wanted to run away, but in my adult world there was no longer any place to which I could flee—and I was curious about what was going on in the old house. There was enough corroboration of Sammy's story to make it clear that he had seen something. But old people sitting in big chairs? I went slowly and self-consciously through the drifts of moist leaves, inhaling the toadstool smell of decay, and moved along the side of the house towards crawling blackness. It seemed impossible that there could be anybody within those flaking walls—the light must have been left burning, perhaps weeks earlier, by a careless real estate man.

I skirted a heap of rubbish and reached the back of the house. A board had been loosened on one of the downstairs windows, creating a small triangular aperture through which streamed a wan lemon radiance. I approached it quietly and looked in. The room beyond was lit by a naked bulb and contained perhaps eight armchairs, each of which was occupied by an old man or an old woman. Most were reading magazines, but one woman was knitting. My eyes took in the entire scene in a single sweep, then fastened on the awful, familiar face of the woman in the chair nearest the window.

Sammy had been right—it was the face of

his dead grandmother.

That was when the nightmare really began. The frightened child within me and the adult George Ferguson both agreed they had stumbled on something monstrous, and that adrenalin-boosted flight was called for; yet—as in a nightmare—I was unable to do anything but move closer to the focus of horror. I stared at the old woman in dread. Her rawboned face, the lump beneath one ear, the very way she held her magazine—all these told me I was looking at May's mother, Mrs. Martha Cummins, who had died suddenly of a brain hemorrhage more than two weeks earlier, and who was buried in the family plot.

Of its own accord, my right hand went snaking into the triangular opening and tapped the dusty glass. It was a timid gesture and none of the people within responded to the faint sound, but a second later one of the men raised his head briefly as he turned a page, and I recognized him. Joe Bryant, the caretaker at Sammy's school. He had died a year ago of a heart attack.

Explanation? I couldn't conceive one, but I had to speak to the woman who appeared to be May's mother.

I turned away from the window and went to the black rectangle of the house's rear door. It was locked in the normal way and further secured by a bolted-on padlock. A film of oil on its working parts told me the padlock was in good condition. I moved further along and tried another smaller window in what could have been the kitchen. It too was boarded up, but when I pulled experimentally at the short planks the whole frame moved slightly with a pulpy sound. A more determined tug brought the entire metal window frame clear of its surround of rotting wood, creating a dark opening. The operation was

noisier than I had expected, but the house remained still and I set the window down against the wall.

Part of my mind was screaming its dismay, but I used the window frame as a ladder and climbed through onto a greasy complicated surface which proved to be the top of an old-fashioned gas stove. My cigarette lighter shed silver sparks as I flicked it on. Its transparent blue shoot of flame cast virtually no light, so I tore pages from my notebook and lit them. The kitchen was a shambles, and obviously not in use—a fact which, had I thought about it, would have increased my sense of alarm. A short corridor led from it in the general direction of the lighted room. Burning more pages, I went towards the room, freezing each time a bare floorboard groaned or a loose strip of wallpaper brushed my shoulder, and soon was able to discern a gleam of light coming from below a door. I gripped the handle firmly and, afraid to hesitate, flung open the door. The old people in the big armchairs turned their pink, lined faces towards mine. Mrs. Cummins stared at me, face lengthening with what could have been recognition or shock.

"It's George," I heard myself say in the distance. "What's happening here?"

She stood up and her lips moved. "Niglon prittle o czanig sovissess!" On the final word the others jumped to their feet with strangely lithe movements.

"Mrs. Cummins?" I said. "Mr. Bryant?"

The old people set their magazines down, came towards the door and I saw that their feet were bare. I backed out into the corridor, shaking my head apologetically, then turned to run. Could I get out through the small kitchen window quickly enough? A hand clawed down my back. I beat it off and ran in the direction opposite to the kitchen, guided by the light spilling from

the room behind me. A door loomed up on my left. I burst through into pitch darkness, slammed it, miraculously found a key in the lock and twisted it. The door quivered as something heavy thudded against the wood from the other side, and a woman's voice began an unnerving wail—thin, high, anxious.

I groped for the light switch and turned it on, but nothing happened. Afraid to take a step forward, I stared into the blackness that pressed against my face, gradually becoming aware of a faint soupy odor and a feeling of warmth. I guessed I was in a room at the front of the house and might be able to break out if only I could find a window. The wallpaper beside the switch had felt loose. I gripped a free edge, pulled off a huge swathe and rolled it into the shape of a torch while the hammering on the door grew more frantic. The blue cone of flame from my cigarette lighter ignited the dry paper immediately. I held the torch high and got a flickering view of a large square room, a bank of electronic equipment along one wall, and a waist-high tank which occupied most of the floor space. The sweet soupy smell appeared to be coming from the dark liquid in the tank. I looked into it and saw a half-submerged *thing* floating face upwards. It was about the size of a seven-year-old boy and the dissolving, jellied features had a resemblance to . . .

No!

I screamed and threw the flaming torch from me, seeking my former state of blindness. The torch landed close to a wall and trailing streamers of wallpaper caught alight. I ran around the tank to a window, wadded its mouldering drapes and smashed the glass outwards against the boards. The planking resisted the onslaught of my feet and fists for what seemed an eternity, then I was out in the cool fresh air and running, barely feeling the ground below my feet,

swept along by the dark winds of night.

When I finally looked back, blocks away, the sky above the old Guthrie place was already stained red, and clouds of angry sparks wheeled and wavered in the ascending smoke.

IV.

HOW DOES ONE assimilate an experience like that? There were some aspects of the nightmare which my mind was completely unable to handle as I walked homewards, accompanied by the sound of distant fire sirens. There was, for example, the hard fact that I had started a fire in which at that very instant a group of old people could be perishing—but, somehow, I felt no guilt. In its place was a conviction that if the blaze hadn't begun by accident I would have been entitled, *obliged*, to start one to rid the world of something which hadn't any right to exist. There was no element of the religious in my thinking, because the final horror in the house's front room had dispelled the aura of the supernatural surrounding the previous events.

I had seen an array of electronic equipment—unfamiliar in type, but unmistakable—and I had seen a *thing* floating in a tank of heated organic-smelling fluid, a thing which resembled . . .

No! Madness lay along that avenue of thought. Insupportable pain.

What else had I stumbled across? Granny Cummins was dead—but she had been sitting in the back room of a disused house, and had spoken in a tongue unlike any language I'd ever heard. Joe Bryant was dead, for a year, yet he too had been sitting under that naked bulb. My son was seriously ill in the hospital, and yet . . .

No!

Retreating from monstrosities as yet unguessed, my mind produced an image of Dr. Pitman. He had attended Granny

Cummins. He had, I was almost certain, been the Bryant's family doctor. He had attended Sammy that morning. He had been in my home the previous day—perhaps when Sammy had come in and spoke of seeing people in the old Guthrie place. My mind then threw up another image—that of the long-barreled .22 target pistol lying in a drawer in my den. I began to walk more quickly.

On reaching home the first impression was that May had gone out, but when I went in she was sitting in exactly the same place in the darkness of the lounge. I glanced at my watch and discovered that, incredibly, only forty minutes had passed since I had gone out. That was all the time it had taken for reality to rot and dissolve.

"May?" I spoke from the doorway. "Did the clinic call?"

A long pause. "No."

"Don't you want the light on?"

Another pause. "No."

This time I didn't mind, because the darkness concealed the fact that my clothes were smeared with dirt and blood from my damaged hands. I went upstairs, past the aching emptiness of Sammy's room, washed in cold water, taped my knuckles and put on fresh clothes. In my den I discovered that the saw-handled target pistol was never meant for concealment, but I was able to tuck it into my belt on the left side and cover it fairly well with my jacket. Coming downstairs, I hesitated at the door of the lounge before telling May I was going out again. She nodded without speaking, without caring what I might do. If Sammy died she would die too—not physically, not clinically, but just as surely—which meant that two important lives depended on my actions of the next hour.

I went out and found the atmosphere of the night had changed to one of feverish excitement. The streets were alive with cars, pedestrians, running children, all

converging on the gigantic bonfire which had appeared, gratuitously, to turn a dull evening into an event. Two blocks away to the south the old Guthrie house was an inferno which streaked the windows of the entire neighborhood with amber and gold. Its timbers, exploding in ragged volleys, were fireworks contributing to the Fourth of July atmosphere. A group of small boys scampering past me whooped with glee, and one part of my mind acknowledged that I had made a major contribution to the childish lore of the district. Legends would be born tonight, to be passed in endless succession from the mouths of ten-year-olds to the ears of five-year-olds. *The night the old Guthrie place burned down . . .*

Dr. Pitman lived only a mile from me, and I decided it would be almost as quick and a lot less conspicuous to go on foot. I walked automatically, trying to balance the elements of reality, nightmare and carnival, and reached the doctor's home in a little over ten minutes. His Buick was sitting in the driveway and lights were showing in the upper windows of the house. I looked around carefully—the fire was further away now and neighbours were less likely to be distracted by it—before stepping into the shadowed drive and approaching the front door. It burst open just as I was reaching the steps and Dr. Pitman came running out, still struggling on his coat. I reached for the pistol but there was no need to bring it into view, for he stopped as soon as he saw me.

"George!" His face creased with concern. "What brings you here? Is it your boy?"

"You've guessed it." I put my hand on his chest and pushed him back into the orange-lit hall.

"What is this?" He surged against my hand with surprising strength and I had to fight to contain him. "You're acting a little strangely, George."

"You made Sammy sick," I told him. "And if you don't make him well again I'll

kill you."

"Hold on, George—I told you not to get overwrought."

"I'm not overwrought."

"It's the strain . . ."

"*That's enough!*" I shouted at him, almost losing control. "I know you're making Sammy ill, and I'm going to make you stop."

"But why should I . . . ?"

"Because he was in back of the old Guthrie place and saw too much—that's why." I pushed harder on his chest and he took a step backwards into the hall.

"The Guthrie house! No, George, *no!*"

Until that moment I had been half-prepared to back down, to accept the idea that I'd gone off the rails with worry, but his face became a slack gray mask. The strength seemed to leave his body, making him smaller and older.

"Yes, the old Guthrie place." I closed the door behind me. "What do you do there, doctor?"

"Listen, George, I can't talk to you now—I've just heard there's a fire in the district and I've got to go to it. My help will be needed." Dr. Pitman drew himself up into a semblance of the authoritative figure I had once known, and tried to push past me.

"You're too late," I said, blocking his way. "The place went up like a torch. Your equipment's all gone." I paused and stared into his eyes. "*They* are all gone."

"I . . . I don't know what you mean."

"The things you make. The things which look like people, but which aren't because the original people are dead. Those are all gone, doctor—burnt up." I was shooting wildly in the dark, but I could tell some of my words were finding a mark and I pressed on. "I was there, and I've seen it, and I'll tell the whole world—so Sammy isn't alone now. His death won't cover up anything. Do you hear me, doctor?"

He shook his head, then walked away from me and went up the broad carpeted stair. I reached for the pistol, changed my mind and ran after him, catching him just as he reached the landing. He brushed my hands away. Using all my strength, I bundled him against the wall with my forearm pressed across his throat, determined to force the truth out of him—no matter what it might be. He twisted away, I grappled again, we overbalanced and went on a jarring rollercoaster ride down the stairs, bouncing and flailing, caroming off wall and bannisters. Twice on the way down I felt, and heard, bones breaking; and I lay on the hall floor a good ten seconds before being certain they weren't mine.

I raised myself on one arm and looked down into Dr. Pitman's face. His teeth were smeared with blood and for a moment I felt the beginnings of doubt. He was an old man, and supposing he genuinely hadn't understood a word I had been saying . . .

"You've done it now, George," he whispered. "You've finished us."

"What do you mean?"

"There's one thing I want you to believe . . . we never harmed anybody . . . we've seen too much pain for that . . ." He coughed and a transparent crimson film spanned his lips.

"What are you saying?"

"It was to be a very quiet, very gradual invasion . . . invasion's the wrong word . . . no conquest or displacement intended . . . physical journey from or world virtually impossible . . . we observed incurably ill humans, terminal cases . . . built duplicates and substituted them . . . that way we too could live normally, almost normally, for a while . . . until death returned . . ."

"Dr. Pitman," I said desperately, "you're not making sense."

"I'm not real Dr. Pitman . . . he died

many years ago . . . first subject in this town—a doctor is in best position for our . . . I was *skorded*—you have no word for it—transmitted into a duplicate of his body . . ."

The hall floor seemed to rock beneath me. "You're saying you're from another planet!"

"That's right, George."

"But, for God's sake, *why*? Why would anybody . . .?"

"Just be thankful you can't imagine the circumstances which made such a project . . . desirable." His body convulsed with sudden pain.

"I still don't understand," I pleaded. "Why should you duplicate the bodies of dying people if it means being locked in an old house for the rest of your life?"

"Usually it doesn't mean that . . . we substitute and integrate . . . the dying person appears to recover . . . but the duplication process takes time, and sometimes the subject dies suddenly, at home, providing us with no chance to take his place . . . and there can be no going back . . ."

I froze as a brilliant golden light flooded through the hall. It was followed by the sound of wheels on gravel and I realized a car had pulled into the driveway of the house. The man I knew as Dr. Pitman closed his eyes and sighed deeply, with an awful finality.

"But what about Sammy?" I shook the inert figure. "You've told me nothing about my son."

The eyes blinked open, slowly, and in spite of the pain there I saw—kindness. "It was all a mistake, George." His voice was distant as he attempted more of the broken sentences. "I had no idea he had been around the old house . . . aren't like you—we're bad organizers . . . *nald denbo soviseegg* . . . sorry . . . I had nothing to do with his illness . . ."

A car door slammed outside. I wanted to run, but there was one more question which had to be asked. "I was in the old house. I saw the tank and . . . something . . . which looked like a boy. Does that mean Sammy's dying? That you were going to replace him?"

"Sammy's going to be all right, George . . . though at first I wasn't hopeful . . . I haven't known you and May as long as Dr. Pitman did, but I'm very fond of . . . I knew May couldn't take the loss, so I arranged a substitution . . . tentatively, you understand, *kleyl nurr* . . . not needed now . . . Sammy will be fine . . ." He tried to smile at me and blood welled up between his lips just as the doorbell rang with callous stridency.

I stared down at the tired, broken old man with—in spite of everything—a curious sense of regret. What kind of hell had he been born into originally? What conditions would prompt anybody to make the journey he had made for such meagre rewards? The bell rang again and I opened the door.

"Call an ambulance," I said to the stranger on the steps. "Dr. Pitman seems to have fallen down the stairs—I think he's dying."

V.

IT WAS QUITE LATE when the police cruiser finally dropped me outside my home, but the house was ablaze with light. I thanked the sergeant who had driven me from the mortuary where they had taken the body of Dr. Pitman (I couldn't think of him by any other name) and hurried along the white concrete of the path to the door. The lights seemed to signal a change in May's mood but I was afraid to begin hoping, in case . . .

"George!" May met me at the door,

dressed to go out, face pale but jubilant. "Where've you been? I tried everywhere. The clinic called me half an hour ago. You've been out for hours. Sammy's feeling better and he's asking to see us. I brought the car out for you. Should I drive? We're allowed in to see him, and I . . ."

"Slow down, May. Slow down." I put my arms around her, feeling the taut gratification in her slim body, and made her go over the story again. She spilled it out eagerly.

Sammy's response to drug treatment had been dramatic and now he was fully conscious and asking for his parents. The senior doctor had decided to bend regulations a little and let us in to talk with the boy for a few minutes. A starshell of happiness burst behind my eyes as May spoke, and a minute later we were on our way to the clinic. A big moon, the exact color of a candle flame, was rising behind the rooftops, trees were stirring gently in their sleep, and the red glow from the direction of the Guthrie house had vanished. May was at the wheel, driving with zestful competence, and for the first time in hours the pressure was off me.

I relaxed into the seat and discovered I had forgotten to rid myself of the pistol which had nudged my ribs constantly the whole time I was talking to the police. It was on the side next to May so there was little chance of slipping it into the glove compartment unnoticed. Shame at having carried the weapon, plus a desire not to alarm May in any way after what she had been through, made me decide to keep it out of sight a little longer. Suddenly very tired, I closed my eyes and allowed the mental backwash of the night's events to carry me away.

The disjointed fragments from Dr. Pitman made an unbelievable story when pieced together, yet I had seen the ghastly proof. There was something macabre about

the idea of the group of alien beings, duplication of dead people, cooped up in a dingy room in a disused house, patiently waiting to die. The memory of seeing Granny Cummins' face again, two weeks after her funeral, was going to take a long time to fade. She, the duplicate, had recognized me, which meant that the copying technique used by the aliens was incredibly detailed, extending right down to the arrangement of the brain cells. Presumably, the only physical changes they would introduce would be improvements—if a person was dying of cancer the duplicate would be cancer-free. Aging muscles might be strengthened—Dr. Pitman and those who had been in the house all moved with exceptional ease. But would they have been able to escape the fire? Perhaps some code of their own would not allow them to leave the house, even under peril of death, unless a place had been prepared to enable them to enter our society without raising any alarms . . .

The aliens may have a code of ethics, I thought, but could I permit them to come among us unhindered? For that matter, had I any idea how far their infiltration had proceeded? I'd been told that Dr. Pitman was the first subject *in this town*—did that mean the invasion covered the entire state? The country? The world? There was also the question of its intensity. The dying man had said the substitution technique failed when a person's death occurred suddenly *at home*, which implied the clinic was well infiltrated—but how thoroughly? Would there come a day when every old person in the world, and a proportion of younger people as well, would be substitutes?

Street lights flicking past the car pulled redly through my closed eyelids, and fresh questions pounded in my mind to the same rhythm. Could I believe anything 'Dr. Pitman' had said about the aliens'

objectives? True, he had appeared kind, genuinely concerned about Sammy and May—but how did one interpret facial expressions controlled by a being who may once have possessed an entirely different form? Another question came looming—and something in my subconscious cowered away from it—why, if secrecy was so vital to the aliens' scheme, had 'Dr. Pitman' told me the whole fantastic story? Had he been manipulating me in some way I had not yet begun to understand? Once again I saw my son's face blindly lolling as he was carried down the stairs, and a fear greater than any I had known before began to unfold its black petals.

I jerked my eyes open, unwilling to think any further.

"Poor thing—you're tired," May said. "You keep everything bottled up, and it takes far more out of you that way."

I nodded. *She's mothering me, I thought. She's happy, serene, confident again—and it's because our boy is getting better. Sammy's life is her life.*

May slowed the car down. "Here we are. We mustn't stay too long—it's very good of Dr. Milligan even to let us in at this time."

I remembered Dr. Milligan—tall, stooped and *old*. Another Dr. Pitman? It came to me suddenly that I had told May nothing at all about the events of the evening, but before I could work out a suitably edited version we were getting out of the car. I decided to leave it till later. In contrast to the boisterous leaf-scented air outside the atmosphere in the clinic seemed inert, dead. The reception office was empty but a blond young doctor with an in-twisted foot limped up to us, then beckoned to a staff nurse when we gave our names. The nurse, a tall woman with mottled red forearms, ushered us into the elevator and pressed the button for the third floor.

"Samuel is making exceptional progress," she said to May. "He's a very strong little boy."

"Thank you." May nodded gratefully. "Thank you."

I wanted to change the subject, because Sammy had never appeared particularly strong to my eyes, and the loathsome blossom of fear was fleshing its leaves within me. "How's business been tonight?"

"Quiet, for once. Very quiet."

"Oh. I heard there was a fire."

"It hasn't affected us."

"That's fine," I said vaguely. If the aliens were constructed with precisely the same biological building blocks as humans their remains would appear like those of normal fire victims. *There'll be hell to pay*, I told myself and desperately tried to adhere to that line of thought, but the black flower was getting bigger now, unmanageable, reaching out to swallow me. Biological building blocks—where did they come from? The dark soupy liquid in the tank—was it of synthetic or natural origin? The thing I'd seen floating in there—was it a body being constructed?

Or was it being dissolved and fed into a stockpile of organic matter?

Had I seen my son's corpse?

Other thoughts came yammering and cavorting like demons. 'Dr. Pitman' had taken Sammy to the clinic in his own car, but he had been strangely delayed in arriving. Obviously he had taken the boy to the Guthrie place. Why? Because, according to his own dying statement, he had despaired of Sammy's life, wanted to spare May the shock of losing her son and had arranged for a substitution—just in case. Altruistic. Unbelievably altruistic. How gullible did 'Dr. Pitman' think I was going to be? If Sammy had died naturally, or had been killed, and replaced by a being from beyond the stars I was going to make trouble for the aliens. I was going to shout

and burn and kill . . .

With an effort I controlled the sudden trembling in my limbs as the nurse opened the door to a small private room. The shaded light within showed Sammy sleeping peacefully in a single bed. My heart ached with the recognition of the flesh of my flesh. ✓

"You may go in for a minute, but *just* a minute," the nurse said. Her eyes lingered for a moment on May's face and something she saw there prompted her to remain in the corridor while we went into the room. Sammy was pale but breathing easily. The skin of his forehead shone with gold borrowed from last summer's sun. May held my arm with both hands as we stood beside the bed.

"He's all right," she breathed. "Oh, George—I would have died."

At the sound of her voice Sammy's eyelids seemed to flicker slightly, but he remained still. May began to sob, silently and effortlessly, adjusting emotional potentials.

"Take it easy, hon," I said. "He's all right, remember."

"I know, but I felt it was all my fault."

"Your fault?"

"Yes. Yesterday at dinner he made me so angry by talking that way about my mother . . . I said I wanted him to drop dead."

"That's being silly."

"I know, but I *said* it, and you should never say anything like that in case . . ."

"Fate isn't so easily tempted," I said with calm reasonableness I had no right to assume. "Besides you didn't mean it. Every parent knows that when a kid starts wearing you down you can say anything."

Sammy's eyes opened wide. "Mom?"

May dropped to her knees. "I'm here, Sammy. I'm here."

"I'm sorry I made you mad." His voice was small and drowsy.

(CONTINUED ON PAGE 87)

WE KNOW WHO WE ARE

ROBERT SILVERBERG

Illustrated by JEFF JONES

There are, it has been said, two kinds of people in the world: those who know who they are, and those who do not. In this short, haunting story, Robert Silverberg tells about what happens when one kind of person meets the other . . .

WE KNOW WHO WE ARE and what we want to be," say the people of Shining City whenever they feel particularly uncertain about things. Shining City is at least a thousand years old. It may be even older, but who can be sure? It stands in the middle of a plain of purple sand that stretches from the Lake of No Return to the River Without Fish. It has room for perhaps six hundred thousand people. The recent population of Shining City has been perhaps six hundred people. They know who they are. They know what they want to be.

Things got trickier for them after the girl who was wearing clothes came walking in out of the desert.

Skagg was the first one to see her. He knew immediately that there was something unusual about her, and not just that she was wearing clothes. Anybody who ever goes out walking in the desert puts clothes on, because the heat is fierce—there being no Cool Machine out there—and the sun would roast you fast if you didn't have some

kind of covering, and the sand would blow against you and pick the meat from your bones. But the unusual thing about the girl was her face. It wasn't a familiar one. Everybody in Shining City knew everybody else, and Skagg didn't know this girl at all, so she had to be a stranger, and strangers just didn't exist.

She was more than a child but less than a woman, and her body was slender and her hair was dark, and she walked the way a man would walk, with her arms swinging and her knees coming high and her legs kicking outward. When Skagg saw her he felt afraid, and he had never been afraid of a woman before.

"Hello," she said. "I speak Language. Do you?"

Her voice was deep and husky, like the wind on a winter day pushing itself between two of the city's towers. Her accent was odd, and the words came out as if she were holding her tongue in the wrong part of her mouth. But he understood her.

He said, "I speak Language, and I understand what you say. But who are

you?"

"Fa Sol La," she sang.

"Is that your name?"

"That is my name. And yours?"

"Skagg."

"Do all the people in this city have names like Skagg?"

"I am the only Skagg," said Skagg.

"Where do you come from?"

She pointed eastward. "From a place beside the River Without Fish. Is this Shining City?"

"Yes," Skagg said.

"Then I am where I want to be." She unslung the pack that she was carrying over one shoulder and set it down, and then she removed her robe, so that she was naked as he was. Her skin was very pale, and there was practically no flesh on her. Her breasts were tiny and her buttocks were flat. From where he stood, Skagg could easily have mistaken her for a boy. She picked up the pack again. "Will you take me into your city?" she asked.

They were on the outskirts, in the region of the Empty Buildings. Skagg sometimes went there when he felt that his mind was too full. Tall tapering towers sprouted here. Some were sagging and others had lost their outer trim. Repair Machines no longer functioned in this part of the city.

"Where do you want to go?" he asked.

"To the place where the Knowing Machine is," said Fa Sol La.

Frowning, he said, "How do you know about the Knowing Machine?"

"Everyone in the world knows about the Knowing Machine. I want to see it. I walked all the way from the River Without Fish to see the Knowing Machine. You'll take me there, won't you, Skagg?"

He shrugged. "If you want. But you won't be able to get close to it. You'll see. You've wasted your time."

They began to walk toward the center of the city.



She moved with such a swinging stride that he had to work hard to keep up with her. Several times she came close to him, so that her hip or thigh brushed his skin, and Skagg felt himself trembling at the strangeness of her. They were silent a long while. The morning sun began to go down and the afternoon sun started to rise, and the double light, blending, cast deceptive shadows and made her body look fuller than it was. Near the Mirror Walls a Drink Machine came up to them and refreshed them. She put her head inside it and gulped as if she had been dry for months, and then she let the fluid run out over her slim body. Not far on a Riding Machine found them and offered to transport them to the center. Skagg gestured to her to get in, but she waved a no at him.

"It's still a great distance," he said.

"I'd rather walk. I've walked this far, and I'll walk to the end. I can see things better."

Skagg sent the machine away. They went on walking. The morning sun disappeared and now only the green light of afternoon illuminated Shining City.

She said, "Do you have a woman, Skagg?"

"I don't understand."

"Do you have a woman, I said."

"I heard the words. But how does one *have* a woman? What does it mean?"

"To live with. To sleep with. To share pleasure with. To have children with."

"We live by ourselves," he said. "There's so much room here, why crowd together? We sleep sometimes with others, yes. We share pleasure with everyone. Children rarely come."

"You have no regular mates here, then?"

"I have trouble understanding. Tell me how it is in your city."

"In my city," she said, "a man and a woman live together and do all things together. They need no one else. Sometimes they realize they do not belong together,

and then they split up and seek others, but often they have each other for a lifetime."

"This sounds quite strange," said Skagg.

"We call it love," said Fa Sol La.

"We have love here. All of us love all of us. We do things differently, I suppose. Does any man in your city have you, then?"

"No. Not any more. I had a man, but he was too simple for me. And I left and walked to Shining City."

She frightened him even more, now.

They had started to enter the inhabited part of the city. Behind them were the long stately avenues and massive residential structures of the dead part; ahead lay the core, with its throbbing machines and eating centers and bright lights.

"Are you happy here?" Fa Sol La asked as they stepped between a Cleansing Machine's pillars and were bathed in blue mist.

"We know who we are," Skagg said, "and what we want to be. Yes, I think we're happy."

"I think you may be wrong," she said, and laughed, and pressed her body tight up against him a moment, and sprinted ahead of him like something wild.

A Police Machine rose from the pavement and blocked her way. It shot out silvery filaments that hovered around her, ready to clamp close if she made a hostile move. She stood still. Skagg ran up and said, "It's all right. She's new to the city. Scan her and accept her."

The machine bathed both of them in an amber glow and went away.

"What are you afraid of here?" Fa Sol La asked.

"Animals sometimes come in from the desert. We have to be careful. Did it scare you?"

"It puzzled me," she said.

Others were nearing them now. Skagg saw Glorr, Derk, Prewger, and Simit; and more were coming. They crowded around

the girl, none daring to touch her but everyone staring hard.

"This is Fa Sol La," said Skagg. "I discovered her. She comes from a city at the River Without Fish and walked across the desert to visit us."

"What is your city called?" Derk demanded.

"River City," she said.

"How many people live there?" asked Prewger.

"I don't know. Many but not *very* many."

"How old are you?" Simit blurted.

"Five no-suns," she said.

"Did you come alone?" Glorr said.

"Alone."

"Why did you come here?" Prewger asked.

She said, "To see the Knowing Machine," and they moved back as if she had proclaimed herself to be the goddess of death.

"The Knowing Machine is dangerous," said Prewger.

"No one may get close to it," said Simit.

"We fear it," said Glorr.

"It will kill you," said Derk.

Fa Sol La said, "Where is the Knowing Machine?"

They backed away from her. Derk summoned a Soothing Machine and had a drink from it. Prewger stepped into a Shelter Machine. Simit went among the others who had gathered, whispering her answers to them. Glorr turned his face away and bowed his head.

"Why are you so afraid?" she asked.

Skagg said, "When the city was built, the builders used the Knowing Machine to make themselves like gods. And the gods killed them. They came out of the machine full of hate, and took weapons against one another, until only a few were left. And those who remained said that no one ever again would enter the Knowing Machine."

"How long ago was that?"

"How should I know?" said Skagg.

"Show me the machine."

He hesitated. He spoke a few faltering syllables of refusal.

She pressed herself close against him and rubbed her body against his. She put her teeth lightly on the lobe of his ear. She ran her fingers along the strong muscles of his back.

"Show me the machine," she said. "I love you, Skagg. Can you refuse me the machine?"

He quivered. Her strangeness attracted him powerfully. He was eight no-suns old, and he knew every woman in Shining City all too well, and though he feared this girl he also was irresistibly drawn to her.

"Come," he whispered.

They walked down sleek boulevards and glowing skyways, crossed brooks and ponds and pools, passed spiky statues and dancing beacons. It was a handsome city, the finest in the world, and Fa Sol La trilled and sighed at every beautiful thing in it.

"They say that those who live here never go anywhere else," she said. "Now I begin to understand why. Have you ever been to another city, Skagg?"

"Never."

"But you go outside sometimes?"

"To walk in the desert, yes. Most of the others never even do that."

"But outside—there are so many cities, Skagg, so many different kinds of people! A dozens cities, a whole world! Don't you ever want to see them?"

"We like it here. We know what we want."

"It's lovely here. But it isn't right for you to stay in one place forever. It isn't *human*. How would people ever have come to this world in the first place, if our ancestors had done as you folk do?"

"I don't concern myself with that. Shining City cares for us, and we prefer not

to go out. Obviously most others stay close to their cities too, since you are the first visitor I can remember."

"Shining City is too remote from other cities," Fa Sol La said. "Many dream of coming here, but few dare, and fewer succeed. But we travel everywhere else. I have been in seven cities besides my own, Skagg."

The idea of that disturbed him intensely.

She went on, "Traveling opens the mind. It teaches you things about yourself that you never realized."

"We know who we are," he said.

"You only think you do."

He glared at her, turned, pointed. "This is the Knowing Machine," he said, glad to shift subjects.

They stood in the center of the great cobbled plaza before the machine. Two hundred strides to the east rose the glossy black column, flanked by the protective columns of shimmering white metal. The door-opening was faintly visible. Around the brow of the column the colors flickered and leaped, making the range of the spectrum as they had done for at least a thousand years.

"Where do I go in?" she asked.

"No one goes in."

"I'm going in. I want you to come in with me, Skagg."

He laughed. "Those who enter die."

"No. No. The machine teaches love. It opens you to the universe. It awakens your mind. We have books about it. We *know*."

"The machine kills."

"It's a lie, Skagg, made up by people whose souls were full of hate. They didn't want anyone to experience the goodness that the machine brings. It isn't the first time that men have prohibited goodness out of the fear of love."

Skagg smiled. "I have a fear of death, girl, not of love. Go into the machine, if you like. I'll wait here."

Fury and contempt sparked in her eyes. Without another word she strode across the plaza. He watched, admiring the trimness of her body, the ripple of her muscles. He did not believe she would enter the machine. She passed the Zone of Respect and the Zone of Obeisance and the Zone of Contemplation, and went into the Zone of Approach, and did not halt there, but entered the Zone of Peril, and as she walked on into the Zone of Impiety he cursed and started to run after her, shouting for her to halt.

Now she was on the gleaming steps. Now she was ascending. Now she had her hand on the sliding door.

"Wait!" he screamed. "No! I love you!"

"Come in with me, then."

"It will kill us!"

"Then farewell," she said, and went into the Knowing Machine. Skagg collapsed on the rough red cobblestones of the Zone of Approach and lay there sobbing, face down, clutching at the stones with his fingers, remembering how vulnerable and fragile she had looked, and yet how strong and sturdy she was, remembering her small breasts and lean thighs, and remembering too the strangeness about her that he loved. Why had she chosen to kill herself this way?

After a long while he stood up and started to leave. Night had come and the first moons were out. The taste of loss was bitter in his mouth.

"Skagg?" she called.

She was on the steps of the Knowing Machine. She ran toward him, seemingly floating, and her face was flushed and her eyes were radiant.

"You lived?" he muttered. "You came out?"

"They've been lying, Skagg. The machine doesn't kill. It's there to help. It was marvelous, Skagg."

"What happened?"

"Voices speak to you, and tell you what to

do. And you put a metal thing on your head, and fire shoots through your brain, and you see, Skagg, you see everything for the first time."

"Everything? What everything?"

"Life. Love. Stars. The connections that hold people together. It's all there. Ecstasy. It feels like having a whole planet making love to you. You see the patterns of life, and when you come out you want everybody else to see them too, so they don't have to walk around crippled and cut off all the time. I just tried a little bit. You can take it mild, strong, any level you like. And when you take it, you begin to understand. You're in tune at last. You receive signals from the universe. It opens you, Skagg. Oh, come inside with me, won't you? I want to go in and take it stronger. And I want you to share it with me."

He eluded her grasping hand, "I'm afraid."

"Don't be. I went in. I came out."

"It's forbidden."

"Because it's good, Skagg. People have always been forbidding other people to have anything this good. And once you've had it, you'll know why. You'll see the kind of power that hate and bitterness have—and you'll know how to soar to the sky and escape that power."

She tugged at him. He moved back.

"I can't go in," he said.

"Are you that afraid of dying?"

"They tell us that the machine makes people monstrous."

"Am I a monster?"

"They tell us that there are certain things we must never know."

"Anybody who says that is the true monster, Skagg."

"Perhaps. Perhaps. But I can't. Look—they're all watching us. You see them, there in the shadows? Everybody in Shining City is here! How could I go in? How could I do something so filthy when all

of them—"

"I feel so sorry for you," she said softly. "To be afraid of love—to pull back from knowledge—"

"I can't help myself."

Gently she said, "Skagg, I'm going back in, and this time I'm going to ask for the most they can give. If there's any love in your soul, come in after me. I'll wait in there for you. And afterwards we'll go off together—we'll visit every city in the world together—"

He shook his head.

She came close to him. He jumped away, as if afraid she would seize him and haul him into the machine, but she went to him and kissed him, a light brushing of lips on lips, and then she turned and went back into the machine.

He did not follow, but he did not leave.

The moons crossed in the sky, and the rain-sphere passed over the city, and the birds of night followed it, and a Riding Machine came to him and offered to take him to his home, and the red light of the morning sun began to streak the sky, and still the door of the Knowing Machine did not open, and still Fa Sol La stayed within. Skagg was alone in the plaza now.

I'll wait in there for you, she had said.

The others, his friends, his neighbors, had gone home to sleep. He was alone. At sunrise he went forward into the Zone of Peril and stayed there a while, and after an hour he entered the Zone of Impiety, and as the full morning heat descended he found himself going up the steps quite calmly and opening the door of the Knowing Machine.

"Welcome to Therapeutic Center Seven," a deep voice said from above, speaking in Language but using an accent even less familiar than the girl's. "Please move to your left for elementary sensory expansion treatment. You will find helmets on the wall. Place a helmet snugly on your head and—"

"Where's the girl?" he asked.

The voice continued to instruct him. Skagg ignored it, and went to his right, along a corridor that curved to circle the column. He found her just around the bend. She wore a helmet and her eyes were open, but she leaned frozen against the wall, strangely pale, strangely still. He put his ear between her breasts and heard nothing. He touched her skin and it seemed already to be growing cold. She did not close her eyes when his fingertip neared them.

There was on her face an expression of such joy that he could hardly bear to look at it.

The voice said, "In the early stages of therapy a low level of stimulation is recommended. Therefore we request that you do not attempt to draw a greater degree of intensification than you are able at this stage to—"

Skagg took the helmet from her head. He lifted her in his arms and found that she weighed almost nothing. Carefully he set her down. Then, taking another helmet from the rack, he held it with both hands for a long time, listening to the instructions and hearing once more the girl's talk of ecstasy and soaring, and comparing all that he saw here to the things that everyone always had said about the Knowing Machine. After a while he put the helmet back in the rack without using it, and picked up the girl again, and carried her body out of the machine.

As he went down the steps, he saw that the others had gathered again and were gaping at him.

"You were in the machine?" Simit asked.

"I was in the machine," said Skagg.

"It killed her but not you?" Derk wanted to know.

"She used it. I didn't. First she used it a little, and then she used it too much, and the second time it killed her." Skagg kept

walking as he spoke. They followed him.

"It is death simply to go inside the machine," Prewger said.

"This is wrong," said Skagg. "You can enter safely. Death comes only from using the machine. From using it wrongly."

"She was a fool," said Glorr. "She was punished."

"Maybe so," Skagg said. "But the machine gives love. The machine gives us goodness."

He put the girl on the ground and summoned a Service Machine. Skagg gave it the girl's pack, asking that it be outfitted with a Water Machine and a Food Machine and a Shelter Machine. The Service Machine went away and came back a short while later. After inspecting the pack, Skagg strapped it over his shoulder. Then he picked up the girl again and began to walk.

"Where are you going with her?" Glorr asked.

"Out of the city. I will find a place for her body to rest in the desert."

"When you return, will you go into the Knowing Machine again?" Simit asked.

"I won't return for a long time," said Skagg. "I have some traveling to do. First to River City, and then to other places, maybe. And then, when I've found my courage, when I know who I really am and what I really want to be, I'll come back here and go into the machine and use it as it was meant to be used. And nothing will ever be the same in Shining City again."

He walked more quickly away from them, out toward the Empty Buildings, toward the plain of purple sand. He wondered how long it would take him to reach that other city beside the River Without Fish, and whether he would meet anyone like Fa Sol La when he got there.

His friends stood watching him until he was out of sight.

"He has become a madman," said

Prewger.

"A dangerous madman," Glorr said.

"Would you do such a thing?" Simit asked.

"Do you mean, go into the machine, or go to another city?" said Derk.

"Either one."

"Of course not," said Derk.

"Of course not," said Glorr as well. "I know who I am. I know what I want to be."

"Yes," Simit said, shuddering. "Why should we do such things? We know who we are."

"We know what we want to be," said Prewger.

—Robert Silverberg

(CONTINUED FROM PAGE 79)

"You didn't make me mad, darling." She took his hand and pressed her lips to it.

"I did. I shouldn't have talked that way about seeing Gran." He shifted his gaze to my face. "It was all a stupid joke like Dad said. I never saw Granny Cummins anywhere." His eyes were bright and deliberate, holding mine.

I took a step back from the bed and the black flower, which had been poised and waiting, closed its hungry petals around me. Sammy, *my* Sammy, had seen the duplicate of Granny Cummins in the old Guthrie place—and no amount of punishment or bribery would have got him to back down on that point. Unlike me, my son had never compromised in his whole life.

Of its own accord, my right hand slid under my jacket and settled on the butt of the target pistol. My boy was dead and this—right here and now—was the time to begin avenging him.

But I looked down on May's bowed, gently shaking shoulders; and all at once I understood why 'Dr. Pitman' had told me the whole story. Had the macabre scenes in the Guthrie place remained a mystery to me, had I not understood their purpose, I could never have remained silent. police, start investigations, cause trouble . . .

Now I knew that the very first casualty of any such action would be May—she would be destroyed, on learning the truth, as

Eventually I would have had to go to the surely as if I had put a bullet through her head. My hand moved away from the butt of the pistol.

Sammy's life, I thought, is her life.

In a way it isn't a bad thing to be the compromising type—it makes life easier not only for yourself but for those around you. May smiles a lot now and she is very happy over the way Sammy has grown up to be a handsome, quick-minded fourteen-year-old. The discovery of a number of 'human' remains in the ashes of the Guthrie house was a nine-day wonder in our little town, but I doubt if May remembers it now. As I said, she smiles a lot.

I still think about my son, of course, and occasionally it occurs to me that if May were to die, say in an accident, all restraints would be removed from me. But the years are slipping by and there's no sign of the human race coming to harm as a result of the quiet invasion. For all I know it never amounted to anything more than a local phenomenon, an experiment which didn't quite work out.

And when I look at Sammy growing up tall and straight—looking so much like his mother—it is easy to convince myself that I could have made a mistake. After all, I'm only human.

—Bob Shaw

HISTORY



BY LEE LAURENCE

A Classic Reprint from **AMAZING STORIES**

ORCHESTRA: (*Introduction . . . Segue to Sustained Chord*)

ANNOUNCER: The Workshop Program!

ORCHESTRA: (*A Quick Wipe Out of Chord*)

SOUND: *Background Noises of Hollywood Premiere . . . Theatre Foyer*

NILES: Good evening, everyone. This is Ken Niles speaking to you from the foyer of Grauman's Chinese Theatre in Hollywood, where the whole world is expectantly awaiting the release of H. G. Wells' "Outline of History" as filmed by World Wide Pictures Incorporated. This is the event the entire

work has been anticipating ever since the day that World-Wide prexy, Alexander Carman, announced his purchase of the great book by the noted English historian. On an earlier broadcast, only a few minutes ago, we interviewed the stars of this picture as they entered the theatre and realized for the first time how little they themselves knew of its production. "Outline of History" has been a two-man job from start to finish—the work of Alexander Carman, President of World Wide Pictures, and Bill Hughes, their chief cameraman. Hughes, himself, did not put in an appearance tonight and it is rumored that he has not been seen at the studio for

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in REVERSE

Time turns back! Here is the incredible story CBS dared not broadcast. The complete script, unexpurgated, exactly as written.

more than a month. Carman himself made the arrangements for releasing this great picture simultaneously in Hollywood, New York, Chicago, London, Paris, Rome, Berlin and Moscow. Within the next few minutes secret operatives of the company will deliver the film in sealed containers and at the same instant, other prints will be delivered to the projection machine operators in each theatre where it is being previewed. There, other representatives of World Wide will break the seals and the World Wide preview will begin.

SOUND: Siren Drawing Near

NILES: The armed escort bearing the prints for Grauman's Chinese is coming down Hollywood Boulevard and is stopping in front of the théâtre. A cordon of police is breaking a path through the crowd and the containers themselves are being unloaded. Soon the world will witness a picture that heretofore only two men have seen in its entirety. And now I must leave for my seat inside the theatre. Just two hours from now in another broadcast I shall

give you a full report on the picture. This is Ken Niles, speaking from Hollywood.

ORCHESTRA: (*Builds to Big Climax . . . Hold Chord Throughout Following for Montage Effect*)

NEWSBOY: Extra! Extra! Read all all about it! Panic in theatres follows showing of "Outline of History." Extra . . . paper!

SOUND: *Motor Running*

POLICE RADIO: Calling all cars in Hollywood area . . . All Hollywood cars. Proceed at once to Grauman's Chinese Theatre . . . restore order. Calling General Hospital . . . Calling General Hospital. . . . (*Fade*)

SOUND: *Traffic Background*

NEWSBOY: Extra paper!

POLICE RADIO: Calling all cars!

SOUND: *Policeman's Whistle . . . Siren*

ORCHESTRA: (*Build to Overall Climax and Out . . . Pause*)

SOUND: *Door Flung Abruptly Open*

CAST: (*Men's Voices in Angry Mood . . . About Six Men*)

SECRETARY: (*Protesting*) But, gentlemen! —Mr. Carman is busy . . . I'm sure . . .

SPENCER: (*Breaking Past*) Oh, he'll see us all right!

CAST: (*Chorus Agreement*)

SECRETARY: But, Mr. Spencer—

CARMAN: (*Off Mike a Little*) That's all right, Miss Wade . . . I'll see them!

SPENCER: You're blamed well right you'll see us, Carman.

CARMAN: (*Calmly*) In fact, I've rather been expecting you.

KIRKMAN: See here, Carman! You've—

CARMAN: (*Rising*) Now just a second, gentlemen. (*Pause*) If you'll find chairs and be seated we'll discuss this matter quietly. (*Somewhat Tired*)

After all, I've been through a lot of this last year and I'm in no mood to argue with you.

SPENCER: (*Threatening*) Oh, you'll talk to us all right! You'll tell us—

VOICES: You bet you will!—It's our right!—etc.

CARMAN: Gentlemen! Gentlemen!

VOICES: (*Quiet*)

CARMAN: Miss Wade, please see that we're not disturbed . . . and call Dr. Thorndyke for me—I . . . I need a stimulant.

MISS WADE: Yes, Mr. Carman.

SOUND: *Door Closes*

CARMAN: (*After Pause*) Well, gentlemen—?

KIRKMAN: (*Demanding*) See here, Alex, we've just come from your preview of "Outline of History." Where did you get those shots?

CARMAN: Some of them I made—here in my studio.

KIRKMAN: (*Raging*) You know what we mean! Where'd you get those shots of the Roman Coliseum?

SPENCER: Where'd you photograph those prehistoric animals?

VOICE: How did you make those pictures of Columbus?

VOICE 2: . . . and the Battle of Hastings! Where'd you get that?

CAST VOICES: *Build to a Climax*

KIRKMAN: (*Demanding Quiet*) Wait a minute, men! (*To Carman*) Alex, we've a right to know how and where you took those pictures! They weren't miniatures and they weren't sets—where did you get them?

CARMAN: (*Toying With Them*) Oh! So you liked those pictures of the post-glacial period, eh, and those of Cheops building his pyramid?

SPENCER: We're not here to talk, Carman, we want to know how you did it! That picture will mean the ruination of all our studios. We can't compete with you on that basis unless we

know where and how you took those shots. The actors and the rest of the cast were superimposed, we know that—ordinary process work—but those originals—how were they taken?

CARMAN: (*Sighing*) Well, I suppose I'll have to tell you sometime, it might as well be now—(*Laugh*) But I warn you—you won't believe me.

SPENCER: Humph! Leave that to us.

CARMAN: Gentlemen, those pictures were, as you've no doubt guessed, originals—*made at the time!*

VOICES: (*React Quickly*) Tommyrot!—He's lying!—You expect us to believe that?—He's stalling us—He's protecting his process! Etc. . . .

CARMAN: (*Waits Till Voices Subside*) There! You see? You don't believe me. . .

KIRKMAN: (*Scoffing*) Why should we? Made at the time. Poppycock!

SPENCER: (*Laugh*) I can just see a caveman grinding away with a camera five hundred thousand years ago. (*Laughs*).

CARMAN: (*Seriously* I can well understand your skepticism, gentlemen, but, those pictures you saw were made by Bill Hughes—my ace cameraman—five hundred thousand years ago.

VOICE: (*Really React This Time*) "The man's mad!"—"It's preposterous!" "He's crazy!" Etc. . . .

SPENCER: (*Breaking In*) No, he isn't, men! He's lying—covering up!

CARMAN: (*Shrugging*) See, you don't believe me. (*Laughs*) And I can't say that I blame you.

SPENCER: (*Changes His Tone*) Look, Alex, we've been friends for years, you and I—and some of the rest of these fellows. We've tackled the problems of the industry together—we've stood shoulder to shoulder through a lot of crises. We've a right to know how you made those pictures. Your patents will be respected—you're

entitled to what royalties you wish from the method—but the process should be made available to all. Those shots were far beyond anything Hollywood has ever turned out—DeMille—Zanuck—Woody Van Dyke—They've never even attempted anything like it.

CARMAN: They couldn't very well, those shots were the real thing.

KIRKMAN: But that's absurd, Alex! Those prehistoric animals lived five hundred thousand years ago!

SPENCER: And it's been two thousand years since the Roman Empire.

CARMAN: Nevertheless, those shots were made by Bill Hughes, *at the time!*

SPENCER: Nonsense! Where's Hughes?

CARMAN: (*Sadly*) I—I don't know. He left three months ago—he was to be gone only overnight—to photograph the ice floes of the Wenz Glacial period. (*Musing*) Oh, I know you all think I'm crazy—I thought so, too. But "Outline of History" is made—it's in the cans. It was previewed tonight to a half million people. That's evidence in itself. The job's done but it can never be repeated. (*Sighs*) Pour me a drink, Sam, and I'll tell you the whole story. Believe it as you will—it's the truth.

SOUND: *Stopper Out of Bottle . . .
Drink Poured*

ORCHESTRA: (*Begins Background for
Narration*)

CARMAN: I was sitting right here at this desk—a year ago last June, when Miss Wade came in the room—

ORCHESTRA: (*Out*).

SOUND: *Door Opens*

MISS WADE: (*Approaching*) Here are those papers you wanted to sign, Mr. Carman.

CARMAN: Any answer from Denver?

MISS WADE: No, sir.

CARMAN: I'm taking Katherine to the Trocadero tonight—call me there if the answer comes through.

MISS WADE: Yes, sir.

SOUND: *Scratching of Pen as Carman Signs Papers*

CARMAN: Send this one back to the purchasing department.

MISS WADE: Very well.

SOUND: *Scratching of Pen Stops*

CARMAN: (*Finishes*) Well, there you are! Call my car will you, Helen?

MISS WADE: Yes, sir. (*Then . . . Suddenly Remembering*) Oh, there's a young man waiting in the reception room—he's been there since noon.

CARMAN: (*A Little Annoyed*) What does he want?

MISS WADE: He refuses to tell me. He sent his card. It—it's there on your blotter.

CARMAN: H-m-m-m-m . . . "Time Travel Incorporated" . . . Dr. Charles Hopkins. . . Tell him I'm busy . . .

HOPKINS: (*Off Mike . . . From Doorway*) I'll just take a minute of your time, Mr. Carman.

CARMAN: I'm busy, young man, I can't see you.

HOPKINS: (*Sadly*) If mortal man could only understand how unimportant time really is.

CARMAN: Your time, perhaps, Dr. Hopkins—not mine. (*To Miss Wade*) Have my car meet me at the side door.

MISS WADE: (*Moving Off*) Yes, sir.

HOPKINS: I know you're busy, Mr. Carman, big responsibilities and all that, but "Time Travel" is—

CARMAN: We're not interested in travelogues, Dr. Hopkins.

HOPKINS: Travelogues?—Oh, (*Little Laughs*) I see my card has you a bit confused. I don't deal in travelogues, Mr. Carman, I deal in Time . . .

CARMAN: I don't want any magazines.

HOPKINS: . . . Time travel . . . Taking people back into the past!

CARMAN: . . . or nuts. Sorry, doctor!

SOUND: *Door Opens*

MISS WADE: Your car's outside, Mr. Carman.

CARMAN: Thanks. Show this young man out, Miss Wade.

HOPKINS: (*Disregarding*) You see time is not the solid substance some people believe it to be, Mr. Carman.

CARMAN: (*Sarcastically*) Interesting.

SOUND: *Door Closes*

HOPKINS: (*Going With Him*) Time, as we know it, is purely subjective. It really has no existence. It's nothing more or less than a mental conception, something which man has developed as quite necessary to his orientation.

SOUND: *Two Pair of Footsteps Down Steps (Five or Six)*

CARMAN: (*Noticing Him Again*) Oh, you still here?

HOPKINS: You see, the trouble with most people is that their mind sticks entirely to the mechanical part of time. All they think of are so many seconds, minutes, hours, days or years. Measurements . . . Those things are merely inventions of men.

SOUND: *Footsteps Across Sidewalk . . . Car Door Opens . . . Motor Idling*

HOPKINS: There are a lot of psychological concepts to the true study of the time continuum. (*Pausing at Door*) After you, Mr. Carman.

SOUND: *Door Slams . . . Motor Moves Through Following*

HOPKINS: You see, time has no factual identity—it's merely the—

CARMAN: (*Turning on Him*) Look here, young man, I don't know who you think you are hounding me like this, breaking into my office—walking out to my car and getting in with me, but I don't like it. Now, where can I drop you?

HOPKINS: It really makes very little difference—I can drop myself anywhere I wish—at will. England, France—the Old Roman Empire—Babylonia—

CARMAN: (*Calling Out*) James!

CHAUFFEUR: Yes, sir?

CARMAN: Drive to the nearest hospital I think we have a patient for them.

CHAUFFEUR: Right, sir.

HOPKINS: I read in a magazine somewhere that you studied Archeology at Stanford, Mr. Carman, that's why I came to you rather than going to Columbia, Twentieth Century, or M.G.M. Look at these!

SOUND: *Unrolling Paper*

CARMAN: Arrowheads?

HOPKINS: Yes, from the Pleistocene period.

CARMAN: But—but they're new.

HOPKINS: They should be. They were just made yesterday by a caveman who lives where the English channel is today.

CARMAN: (*Calling His Bluff*) Say! What is all this?

HOPKINS: You see the Neanderthal man had not yet learned the use of metals. Here's a photograph of his cave . . . and much later—one of the Acropolis.

CARMAN: The Acropolis? But *it's* in ruins!

HOPKINS: I know it is, *today*. But I photographed it yesterday as I was returning from the Neanderthal period. It's a beautiful building! The photograph hardly does it justice. It was taken with a cheap box camera.

CARMAN: Are you crazy?

HOPKINS: That's what you told your chauffeur.

CARMAN: But this picture—it's—it's faked!

HOPKINS: Oh, come now. Mr. Carman, you're in the picture business. Look at it closely—does that look like a fake?

CARMAN: Well—it's pretty good. Miniature?

HOPKINS: Does that look like a miniature, Mr. Carman?

CARMAN: (*Hesitantly*) Well, no.

HOPKINS: Here's a picture of the Circus Maximus in Rome. That's quite a crowd, isn't it?

CARMAN: The Circus Maximus? My God! Am I crazy?

HOPKINS: You thought *I* was.

CHAUFFEUR: (*Off Mike*) Did you call, sir?

HOPKINS: Yes, drive *Mr. Carman* to the Hollywood Hospital!

ORCHESTRA: (*Bridge*)

SOUND: *Car Braking . . . Stops . . . Door Opens*

CHAUFFEUR: Hollywood Hospital, Mr. Carman.

CARMAN: Very well. As you were saying, Doctor Hopkins—

HOPKINS: The human brain has a strongly developed time sense—we're born with—

SOUND: *Car Door Slams Shut*

CARMAN: (*To His Driver*) Wait here—(*Changing His Mind*) No—go on home. I'll take a taxi. Call Mrs. Carman at the Trocadero about nine and tell her I was detained.

CHAUFFEUR: Very good, sir.

SOUND: *Car Door Slams Shut . . . Car Drives Away*

HOPKINS: My laboratory is just a few doors from the hospital here.

SOUND: *Walking Starts . . . Two Pair Footsteps on Cement Walk*

HOPKINS: As I was saying—the existence of time is so firmly embedded in the human mind that we can think of it in no other way. I have made a detailed study of not only the physical sciences, chemistry, biology, electricity, but the metaphysics and psychology as well. From these studies I have succeeded in constructing a conveyance which takes me backward into time. I made the first journey yesterday. That's where I obtained those flint arrowheads.

CARMAN: But why did you come to me?

HOPKINS: Because I need money to

carry on my research. When my father died he left me a quarter of a million dollars—that has all been spent.

CARMAN: But—

HOPKINS: You perhaps wonder why I do not go to the other scientists? They would be decidedly more difficult to convince than yourself, and besides—has it ever occurred to you, Mr. Carman, that you could send a cameraman with me back into time and photograph certain events you couldn't possibly duplicate in your studio?

CARMAN: (*Realizing It*) My God! A photographic record of the history of the world!

HOPKINS: Precisely. In here, please.

SOUND: *Footsteps Up Porch Steps ... (Concrete)*

CARMAN: "Outline of History" as it actually happened!

HOPKINS: I have no doubt that you could buy the title of Mr. Wells' book, although let me warn you the events may not transpire exactly as he has set them down.

CARMAN: At least *he* couldn't squawk at the movie version as other authors do.

SOUND: *Door Opens*

HOPKINS: In here, please. I hope you'll overlook the appearance of my house. I live alone and scientists are notoriously bad housekeepers. The cleaning woman comes every Friday.

CARMAN: (*Stopping*) Just a second! How do I know, Dr. Hopkins, that this is not a trick?

HOPKINS: I intend to give you sufficient proof.

SOUND: *Door Rolls Back (Make It a Heavy One)*

HOPKINS: My laboratory is in here. I'll find the light for you, that step is rather tricky.

SOUND: *Click of Switch*

HOPKINS: There!

CARMAN: Amazing!

HOPKINS: My workshop. You like it?

CARMAN: It seems very complete.

HOPKINS: A man can do a lot with a quarter of a million dollars—Imagine what can be done with two million more.

CARMAN: *Two* million?

HOPKINS: (*Casually*) Yes, that's what I need to carry on my work. Platinum — radium — rare alloys. They're quite expensive.

CARMAN: But—

HOPKINS: You'll pardon me if I work while I talk? Of course I understand that two million dollars is a lot of money.

CARMAN: You can hardly borrow it at the corner bank.

HOPKINS: (*Laughs*) On my security, no. But, I thought to myself, the motion picture industry is a great industry. They have much money. And they could use what I have to offer. So I came to you.

CARMAN: Look, Dr. Hopkins, let's lay our cards on the table. I'm afraid I went a bit too far in even allowing you to persuade me to accompany you on this visit. Such a thing as you're suggesting is quite impossible. You obviously need a lot of money. But I don't own World Wide Films. It's a corporation. The heads of that corporation in New York, the bankers who control it, aren't just handing me two million dollars to use as I see fit—and if this thing of yours works we wouldn't dare let the news out—not even to our own board of directors. There's too much interlocking money in our companies.

HOPKINS: Perhaps some of your competitors would feel differently. I haven't approached them yet. Look closely at this picture of the Circus Maximus. Imagine what a great picture could be made using those real shots as a background for your actors. Process shots. Monty Hague driving a chariot

against a background of the real thing. And look at the money you'd save in sets

CARMAN: (*Awe Stricken*) It's unbelievable! (*Changing*) But how do I know these pictures are real? After all, I don't know all there is to know about pictures. Even I could be fooled by some clever new process.

HOPKINS: I thought you'd bring that up, Mr. Carman. (*Decision*) Very well, I'm prepared to bring you physical evidence—from the past! Here, tonight.

CARMAN: I'm afraid I don't understand.

HOPKINS: This translucent glass ball houses my time conveyor. In a few minutes while you're standing here I shall enter it and go back into the past. From there I shall bring you physical evidence of my ability to travel through time.

CARMAN: You're mad!

HOPKINS: (*Kindly*) You really don't think that, Carman. It's just that your mind will not permit you to believe in me. It's been trained *the other way* for centuries. Five years ago I succeeded in releasing my thinking process from intuitive force, then and only then could I conceive time and space in its true light.

CARMAN: This is too much for me, Dr. Hopkins.

HOPKINS: You are not to blame. There's a comfortable chair, Carman. Sit down and you can observe from there—see that I resort to no trickery. I am about to enter the time globe. In a few seconds it will fade into the air and disappear, but do not allow yourself to be alarmed. In less than twenty minutes I shall return with physical evidence of my journey. Mr. Carman, I bid you good afternoon!

SOUND: *Metal Door Clangs Shut*

SOUND: *Thirty Seconds for Experi-*

mental Effects . . . Two Oscillators at Almost a Beat Note Forming Rhythm for Orchestra Blend

ORCHESTRA: (*Starts Blending*)

CARMAN: (*Shouting*) No! No! It's fading!—My God! He's gone!

ORCHESTRA: (*To Quick Climax . . . Cut*)

CARMAN: (*Back in Original Scene Talking to Fellow Producers*) . . . I thought perhaps I'd gone mad, gentlemen. For ten minutes or so I sat there in Doctor Hopkins' laboratory completely stunned. Then I arose and walked up to the platform upon which the glass ball had rested. I stretched out my hands and—as God is my witness, gentlemen, I could feel but not see the glass ball! (*Surprised Murmurs From Cast*) I went entirely around its surface, feeling it, but not seeing it . . . then limp with excitement I returned to my chair. Several times I had a desire to run from the house screaming for help, but I fought it back! . . . Then as the minute hand on my watch neared the twenty minute mark I became aware of a low humming which gradually increased in volume.

SOUND: *Bring in Oscillator . . . Low to High Frequency Variation*

CARMAN: . . . A curious thing happened. . . . I began to see the outlines of the glass ball. Then the sides . . . then the port hole and at last, the door. The ball itself took on a rosy hue . . . then it stopped . . . the noise.

SOUND: *Oscillator Cuts Abruptly*

CARMAN: The steel door opened.

SOUND: *Clang of Metal Door Being Opened*

HOPKINS: Good afternoon! I was afraid you'd become frightened and had run away.

CARMAN: (*Upset*) Hopkins! Tell me I'm mad! Tell me I've been drinking! Tell me I'm crazy! Anything but what I saw!

HOPKINS: What you have just wit-

nessed was the truth, Carman, a journey backward into time. I would have enjoyed having had you as my guest but the size of the machine prevents it. This is one reason I need your financial backing . . . to increase the size and power of my time globe.

CARMAN: The proof—you have it?

HOPKINS: Yes, Carman, I have it. Here.

CARMAN: (*Puzzled*) What is this?

HOPKINS: That tube is the original Galileo telescope. He just finished constructing it this afternoon. He left it on his workbench and I borrowed it. You are acquainted with its history, I believe.

CARMAN: It's unbelievable, Dr. Hopkins.

HOPKINS: It's not at all mysterious when one understands the space-time continuum—

CARMAN: This is too much to believe! You're trying to work some kind of a game.

HOPKINS: (*Suddenly Hard*) All right, Mr. Carman, I'm tired of trying to convince you! I'm tired of being called a fake—a swindler. How's this for proof? If you don't accept this document as such I shall consider our negotiations at an end! Here! Look at this!

CARMAN: (*Awe Stricken*) The—The Magna Carta!

HOPKINS: The English Bill of Rights! Freshly signed! The ink is hardly dry. It was left on a desk only a few minutes ago while the signers withdrew for religious blessing. This paper and Galileo's telescope must be returned before they are missed, otherwise world history may be affected. I shall call upon you at your office tomorrow morning at ten for your answer!

ORCHESTRA: (*In Heavy for Bridge*)

CARMAN: (*Narrating*) I'm sure you gentlemen must realize what went on

inside my brain that night. I called Dr. Thorndyke about three A.M. and he gave me a sleeping powder. When I awoke next morning I was determined to go through with it. I decided that I'd get the two million dollars to swing that deal or go out of business trying. At eight thirty I called the bank in New York. I refused to tell them what I wanted the money for. I offered them all my stock—my home—all that I had as security—as proof of my sincerity. They said they'd think it over. At nine-thirty I called Bill Hughes, my ace cameraman in off the set . . .

SOUND: *Buzz of Intercommunicating Set*

CARMAN: Yes . . . ?

MISS WADE: (*On Filter*) Bill Hughes is here.

CARMAN: Send him in.

SOUND: *Click . . . of Box*

SOUND: *Door Opens*

HUGHES: (*From Doorway*) Hi, Alex!

SOUND: *Door Closes*

HUGHES: You look worried.

CARMAN: (*Solemnly*) Sit down, Bill.

HUGHES: Sure, boss, what's wrong? How's your hay fever? Mind if I smoke?

CARMAN: (*Seriously*) Bill, we've got a matter to talk over, man to man. When we get through you may refuse the assignment. If you do—it's all right with me. But before we start I must have your promise that you'll never repeat one word of our conversation.

HUGHES: Gee, boss, you make it sound important.

CARMAN: It is. Help yourself to a drink.

SOUND: *Bump of Bottle on Table . . .
Drink Is Poured Behind Following*

CARMAN: First of all, I want you to know that I'm perfectly well—that I had Dr. Thorndyke examine me last night and he reports that I'm mentally

and physically fit.

HUGHES: (*Laughs*) Which is saying a lot for anyone in the picture business. Here's how!

CARMAN: This is something we can't joke about, Bill. (*Pause*) A man came to me yesterday, a Doctor Hopkins, has a dozen degrees including a PH.D. He told me he had invented a time-globe, a machine to take him backwards into time.

HUGHES: That's possible.

CARMAN: (*Surprised*) What?

HUGHES: Sure. It's purely a matter of metaphysics.

CARMAN: He showed me photographs of buildings and scenes of prehistoric periods taken last week.

HUGHES: (*Whistles*) That's quite an item.

CARMAN: I assure you the photographs were genuine, not faked.

HUGHES: Did he show you anything else, Alex?

CARMAN: Yes, I accompanied him to his laboratory where he gave me an actual demonstration of the machine by bringing back two famous articles of history—not in their museum state—but new, fresh, authentic.

HUGHES: Boy! What a newspaper yarn that'd make!

CARMAN: A good way to get ourselves into a padded cell if it's ever printed. This doctor needs two million dollars to complete his work. Some of the vital elements are way over his head in price—so he came to me.

HUGHES: Smart. He knows that you could use his invention.

CARMAN: That's right. I talked to New York just a few minutes ago. Told 'em I couldn't tell them what the money would be used for.

HUGHES: (*Sarcastically*) I'll bet they liked that.

CARMAN: They're calling me back at ten—the doctor is due here also. In

the meantime I'll have to talk fast. Here's what I want to do if New York comes through with the money.

HUGHES: Shoot.

CARMAN: I've cabled London. Told Heatherstone to buy the motion picture rights to H. G. Wells' "Outline of History"—

HUGHES: "Outline of History"? . . . Isn't that pretty dry stuff, Alex.

CARMAN: Not the way we'll make it. Now look, Bill, I want you to do all the photography on this thing, all the authentic stuff.

HUGHES: But I thought this doctor—

CARMAN: He's a scientist, not a photographer. That's why I've called you in before he gets here—to see if you'll take the job. You can name your own price.

HUGHES: That's throwing things at a fellow pretty sudden like, Alex.

CARMAN: No more suddenly than it was thrown at me, Bill.

HUGHES: But this globe, this time machine—what effect—

CARMAN: I don't know anything about that part of it. That'll have to wait till Dr. Hopkins gets here. All I know is that we're on the threshold of the greatest development motion pictures have ever made.

SOUND: *Buzz of Intercommunicating Set . . . Click of Switch*

CARMAN: Yes?

MISS WADE: (*On Filter*) That young man who was in here yesterday is back.

CARMAN: Dr. Hopkins?

MISS WADE: (*On Filter*) Yes, sir.

CARMAN: Tell him to wait, please.

SOUND: *Click of Switch*

CARMAN: (*Turns to Hughes Quickly*) He's outside now, Bill—what's your answer?

HUGHES: (*Slowly*) You've been more or less of a Godfather to me, Alex, I don't think you'd ring me into any-

thing phoney. If New York comes through with the money and if this Dr. Hopkins looks all right to me, I'll do it.

CARMAN: Good!

SOUND: *Click of Switch*

CARMAN: Send Dr. Hopkins in.

MISS WADE: (*On Filter*) Yes, sir. (*Turning*) You can go in now.

SOUND: *Click of Switch . . . Door Opens*

HOPKINS: (*From Doorway*) Good morning, Mr. Carman.

SOUND: *Door Closes*

CARMAN: Good morning, doctor.

HOPKINS: I hope I didn't spoil too much of your evening last night.

CARMAN: You didn't — (*Shaking Hands*) How are you, doctor?

HOPKINS: Fine, thank you.

CARMAN: Dr. Hopkins, this is Bill Hughes.

HOPKINS: Glad to know you.

HUGHES: Howdy.

CARMAN: Hughes is our most valuable cameraman—worked for years on our newsreel staff. An ideal man for the work we discussed.

HOPKINS: Excellent. Ah— (*Hesitantly*) I hope you impressed Mr. Hughes with the need for secrecy?

CARMAN: Bill's all right. I practically raised him from a kid. We have nothing to worry about on that score.

HUGHES: Mr. Carman has been telling me an amazing story.

HOPKIN: To the layman I imagine it would be amazing.

HUGHES: Your invention, doctor, is it something along the lines of the Hans Plaudt theory of psychology—

HOPKINS: To an extent only — Plaudt stops short of the actual time development. He is correct in his theory of an exaggerated time-sense only in the fact that the exaggeration was born of human frailty. You are a student of metaphysics, Mr. Hughes?

HUGHES: In a way.

HOPKIN: Then I shall be most pleased to work with you, to show you the mistakes in metaphysical deductions.

SOUND: *Phone Rings*

HUGHES: There's your New York call, Alex.

SOUND: *Phone Pickup*

CARMAN: Hello . . . Yes. Put him on . . . (*Aside*) It's J. P. . . . Hello. Yes, I've been waiting right here . . . what's that? . . . (*Arguing*) I know, J. P., but I *can't* tell you any more than I've told you! You've got to *believe* me! . . . I know it is . . . Sure. . . . Look, J. P., I'd put my own money into this if I had it, but I don't . . . All right, I know it sounds like a crackpot idea . . . I don't blame you . . . but I wish you'd put more faith in my judgment. (*Sorrowfully*) All right . . . sure . . . goodbye.

SOUND: *Slow Hangup*

CARMAN: Well, gentlemen — there you are!

HUGHES: I didn't think you'd get away with it, Alex, they're pretty tight-fisted, that bunch.

HOPKINS: (*Slowly*) Gentlemen, I'm not much on money matters, and what I'm going to propose might not be exactly—well—legal. But it might be a pleasant solution to our problems. Once before I thought of doing it but it requires a certain amount of capital.

CARMAN: What are you getting at, Doctor Hopkins?

HOPKINS: I was noticing in the morning papers that Burgess Aircraft Consolidated gained fifteen points in the past ten days.

CARMAN: Burgess Aircraft is a purely speculative stock—it's liable to do anything. Why?

HOPKINS: Armed with the information of what it did in the past ten days, why couldn't someone, if he so desired *and* if he had the money, why couldn't

he go back in time ten days in my time globe and make a purchase. Then wait for it to rise and sell out this afternoon.

HUGHES: Good Lord! What an idea!

HOPKIN: Of course it would have to be done on several exchanges in small amounts — otherwise it might cause disastrous complications.

CARMAN: But—

HOPKINS: If, as you say, it is a speculative stock, guided largely by gamblers, I see no reason for not using it for the advancement of science—and Wide World Pictures.

CARMAN: What do you think, Bill?

HUGHES: Sounds screwy to me. But at least if it works, we'll have definite proof of Dr. Hopkins' time machine.

CARMAN: By Jove, I'll do it!

SOUND: *Click of Switch*

MISS WADE: Yes, Mr. Carman?

CARMAN: Bring me my checkbook! I want to write a check.

MISS WADE: Yes, sir.

SOUND: *Click of Switch*

HOPKINS: And don't forget, Carman, to date it back ten days!

ORCHESTRA: (*Bridge . . . Down For:*)

CARMAN: (*Narrative*) . . . and so, gentlemen, we made money on the market to finance the construction of a larger, more powerful machine. . . . In the days that followed, Bill Hughes and Doctor Hopkins became good friends and worked together like madmen to complete the building of the second machine. It was as thoroughly equipped as money could make it. Both men realized fully the dangers of the venture and figured on every possible precaution. Especially did they purchase heavy big game guns, knowing that adventures in the past ages would bring them face to face with formidable foes. The night before the first trip into the past the men had dinner at my home.

. . . I dismissed my servants immediately after dinner so that we could talk freely. (*Fading*) The discussion was held in my study before a blazing log fire.

SOUND: *Crackling Flames In*

HUGHES: Wonder where we'll be this time tomorrow night, Doc?

HOPKINS: (*Chuckle*) Dodging Norman arrows in 1066 over Hastings, most likely.

CARMAN: Look here, you two, are you *sure* you're taking everything you'll need for safety?

HUGHES: Can't tell definitely, Alex, but we're pretty well equipped. Had to go as light as possible. Camera equipment itself heavy as all get out.

HOPKINS: You see . . . rather than make the first jaunt a long one as we'd originally planned, Mr. Carman, Bill and I have decided to shoot some scenes from "The Battle of Hastings" and return. If we find we're short of anything we'll have time to get it before the big scenes.

CARMAN: I'm worried just a bit about the film on the "Pompeii" scenes, the heat and ashes may play havoc with it.

HOPKINS: We're planning to photograph the Vesuvius eruption from one of the side ports in the globe. It'll be too dangerous to go outside for it. . . . (*Dreaming*) You know, it's strange, here we are in 1939. . . . We know for sure that Vesuvius is going to explode in 63 A. D. . . . it seems like we should go back and warn the residents of Pompeii to flee before it does.

HUGHES: Fat chance we'd have doing it, Doc. The people'd take one look at us and our funny 1939 clothes and burn us as devils.

CARMAN: Bill's right. All of which brings up the question of how often are you going to permit yourselves to be seen?

HUGHES: As seldom as possible. Of

course there are some shots that we'll have to leave the globe for, and when we do, we'll be visible.

CARMAN: But the globe itself, won't it be visible?

HOPKINS: When we're at rest in time, yes. But in case of attack it's always easy to slip back a few years and disappear.

HUGHES: Or go ahead a few years and watch your enemy die of old age. Come on, Doc, let's turn in . . . We'll need some sleep. I don't know how going backward in time affects your powers of slumber but personally I'd like to get some shut-eye before we start.

ORCHESTRA: (*In With Bridge . . . Background for Following*)

CARMAN: (*Narrative*) The next evening at six o'clock the three of us met in Dr. Hopkins' laboratory. It had been enlarged to house the new time globe and was strewn with pieces of equipment which had been discarded to make room for the camera and film containers. Because of the static effect of the two large gyroscopes, the camera on this first expedition had not been fitted for sound. . . . I noticed that Doctor Hopkins was exceedingly nervous as he made the few last minute adjustments before the departure . . .

ORCHESTRA: (*Fades Out*)

HOPKINS: I'm still not so sure I should take you on this test trip, Bill. There are a lot of things might need adjusting.

HUGHES: (*Cutting In*) Shucks, doc. If it's good enough for you it's good enough for me. (*Light Laugh*) Besides, Alex here has a couple of million bucks sunk in this thing and I know he'll want me to go along to watch over his investment.

CARMAN: (*Consolingly*) There's no hurry about things, Doctor. If you want a few more weeks for tests it'll be quite

all right with me.

HOPKINS: It's as ready as it'll ever be, Mr. Carman. The final test is the trip itself.

CARMAN: You still plan to visit the Egyptian Dynasties on this first hop?

HOPKINS: Yes. I don't want to put too much strain on the converter units for the first trip.

HUGHES: Well, I'm all set if you are, Doc. Film, exposure meter, and camera. That's all I need. I'm traveling light as you told me.

HOPKINS: We're all set then—climb in and take your seat.

CARMAN: (*Hesitantly*) I won't wait for the departure, if you don't mind. I—I don't think I could stand the strain.

HOPKINS: As you wish, Mr. Carman.

CARMAN: All I can say is—good luck—and well—the devil with the pictures if you get into trouble.

HOPKINS: There'll be no danger as long as we're inside the globe—the only dangers will be stepping outside to photograph.

CARMAN: Well—take care of yourselves.

HUGHES: (*Calling Out*) So long, Boss, you just sit tight and I'll bring you a five thousand year old egg for breakfast!

ORCHESTRA: (*Dramatic Bridge . . . Fade For*)

CARMAN: (*Resuming His Narration*) I don't mind telling you, gentlemen, I went direct to the Glover Club and got drunk. I awoke the next morning with a splitting headache. Before I was fully dressed my private phone rang.

ORCHESTRA: (*Out*)

SOUND: *Phone Rings*

CARMAN: (*Slightly Groggy*) Hello.

HUGHES: (*On Filter Mike*) Hello, boss. How are you?

CARMAN: (*Snapping Out of It*)

HUGHES! Where in God's name are you?

HUGHES: Sitting on the banks of the Nile fishing for crocodiles.

CARMAN: This is no time to be funny. What's the matter, didn't it work?

HUGHES: I'll say it worked! And how! The Doc and I are down at your private laboratory—We've just finished developing the first hundred feet! How soon can you get here?

SOUND: *Carman Hangs Up Phone Without Answering*

CARMAN: (*Shouting*) Williams—call my car immediately!

ORCHESTRA: (*Quick Bridge . . . Agitato*)

SOUND: *Door Opens*

CARMAN: (*Rushing In*) Bill,—Doctor. Thank Heavens I wasn't dreaming after all! How are you?

HUGHES: Swell, boss! Wait'll you get a load of this. (*Calling*) That film dry enough to project, Doc?

HOPKINS: (*Off . . . Approaching*) Yes—it's all set. (*Coming In*) How are you, Mr. Carman?

CARMAN: Hello, Doc. This venture is going to be the death of me yet. What'd you get?

HUGHES: (*Enthusiastically*) Just wait till you see! All set, Doc?

HOPKINS: All set.

HUGHES: Turn off the lights, boss, and we'll show you something that'll knock your eyes out!

SOUND: (*Click of Light Switch*)

HUGHES: Snap on the projector.

SOUND: (*Click of Switch . . . Motion Picture Projector Runs*)

CARMAN: What in God's name is that?

HOPKINS: That is the desert around Gizeh, Mr. Carman.

CARMAN: Where they built the pyramids?

HOPKINS: Right—and this picture.

This is the River Nile as it was in 5000 B. C.

CARMAN: (*Intensely Interested*) Looks very much like the Mississippi does today.

HOPKINS: Very much.

HUGHES: Get a load of this next shot, boss.

CARMAN: (*Reaction*) Great Scott!

HUGHES: Those are Egyptian slaves, boss. Thousands of them.

CARMAN: What are they doing?

HOPKINS: They're working to divert a section of the river and make it run about thirty miles to the east. Science has long wondered how the Egyptians transported the mighty stones of the pyramids to the construction site. Look at this.

CARMAN: (*Incredulous*) For God's sake! They were floated in place!

HOPKINS: Yes. See those huge rafts. The stones were floated almost a hundred miles down the Nile and then took the new river channel east. It is a beautiful example of early engineering. The close-ups are on the next reel.

SOUND: *Projector Off . . . Light Switch On*

CARMAN: (*Breathlessly*) Gentlemen—I—I must admit that for the first time in my life—I'm speechless.

HUGHES: Wait'll you see these next reels, boss, and you'll break your neck running for a straight-jacket.

ORCHESTRA: (*Bridge to Narration*)

CARMAN: (*Resuming His Story*) The rest of the morning still seems like a dream. For an hour I sat there and saw gangs of swarthy workmen unload the stones that had come down the Nile. There were city scenes too, a hawking merchant spreading his stock of Babylonian garments before the eyes of some pretty, rich lady; a miscellaneous crowd swarming between the pylons to some temple festival at Thebes; an excited, dark-eyed audience looking much like

the Spaniards of today watching a bull fight; a group of children learning their cuneiform signs on clay tablets at a school in Nippur. . . . As the weeks went on, an obsession began to form in my mind, and try as I would I was unable to cast it aside. Before the first six months of filming was completed I knew that I would never be satisfied until I had made one of those journeys into the past. Just before the final scenes were to be shot, I caught Doctor Hopkins alone in his laboratory.

ORCHESTRA: (*Up and Out*)

SOUND: *Door Opens*

CARMAN: Busy, Doc?

HOPKINS: No. Come in.

SOUND: *Door Closes*

CARMAN: I brought the last section of script over myself.

HOPKINS: (*Going Right on Working*) Oh, the Glacial Period scenes? Good—I was wondering when we'd make them.

CARMAN: Hughes and I have been editing and cutting the picture ourselves—We don't dare call anyone else in on it.

HOPKINS: I can well understand. How much more will we shoot?

CARMAN: Just the glacier scenes and we're through.

HOPKINS: Good.

CARMAN: There's something I want to ask you, Doc.

HOPKINS: Yes? What's that?

CARMAN: I want you to take me with you on this last trip.

HOPKINS: As a photographer?

CARMAN: No. As a passenger. Hughes will have to go along for the pictures. I don't know anything about cameras.

HOPKINS: I'm afraid that's not possible, Carman. You see, this will be the longest trip we've made—and space inside the globe is at a premium.

CARMAN: But—

HOPKINS: As it is, I don't dare risk the equipment to the extent of visiting the *first* of the big glaciers. As near as we can make out, that was five hundred thousand years ago. Hughes and I plan to visit the fifth—the one from which the earth is now emerging.

CARMAN: When was that?

HOPKINS: Less than fifty thousand years ago.

CARMAN: But surely you can take me on *that* trip.

HOPKINS: It's purely a question of space, Carman. The globe is not nearly large enough.

CARMAN: But — (*Suddenly Seized With an Idea*) I have it! Your *first* time globe. The one you gave me that demonstration in. Is it still intact?

HOPKINS: Why yes, but—

CARMAN: Then there's no reason why with a few instructions I can't accompany you. Now—no more arguments, Hopkins. It's my money that is making this trip possible and *I'm going!*

ORCHESTRA: (*Hits This Statement With Positive Chord*)

CARMAN: (*Back to Narration*) Two weeks later we left for the Glacial period. I was operating the small time globe by following a series of written instructions by Doctor Hopkins. Hopkins had selected the region around Stagshaw, England, for the scenes because of better light conditions. I will not attempt a description of the voyage because there was nothing to describe. Latitude and longitude had been carefully planned. Both globes were in contact by radio. At a signal I threw the first switch. The walls of the globe took on a rosy hue. Carefully I followed the directions and the rosy color grew deeper and deeper. My ears lost their sense of hearing, and my senses reeled. I watched the micrometer hand on the sweep second dial. At the in-

structed point I cut the switch. There was a gentle bump and my hearing returned. The walls of the globe turned suddenly very white and I heard the voice of Doctor Hopkins come over the radio.

HOPKINS: (*On Filter*) We are now at rest in time fifty-five thousand years before the birth of Christ. The world is already dying under the intense cold. The whiteness of your window ports is caused by frost. Take a torch and melt it loose. You should be able to see our globe out your right port.

CARMAN: (*Back to Narrative*) I did as I was instructed and a spectacular sight met my eyes. Not less than a hundred feet away was our other time globe. We were at rest on a frozen and frost whitened earth. In every direction as far as my eyes could see, the world was white. I melted the frost on my left port and was amazed at what I saw. A huge wall of ice, the Wenz Glacier, towering almost three thousand feet high, was steadily advancing toward us. I was seized with a desire to flee but the voice of Doctor Hopkins over the radio reassured me.

HOPKINS: (*On Radio*) There is little danger from the ice unless a piece should break off and fall. And that is highly improbable. The rate of advance is only six-inches a minute. We are reasonably safe for the time being. Hughes is going outside to photograph.

CARMAN: As he spoke, I saw the door of the other globe open and Bill Hughes step out. He was completely encased in furs, dressed very much like an Esquimo. He walked about five hundred yards away from the time ship and set up his camera. Then it happened.

ORCHESTRA: (*Take Up Agitato Theme*)

CARMAN: From an ice floe at the bottom of the glacier emerged a mammoth, but such an animal as was never

seen. Fully as large as an elephant and gaunt with hunger it charged straight at Hughes. Hughes had no time to run. Whipping off a fur mitten he drew his revolver and fired six shots into the beast. The leaden pellets only served to infuriate him more, but Doctor Hopkins had prepared the cameraman for all emergencies. Reaching beneath his furs Hughes withdrew a hand grenade. Holding the pin between his teeth he pulled the weapon and threw it straight into the face of the charging mammoth. There was a tremendous explosion and the animal flew into a thousand pieces. The concussion knocked Hughes flat on his back. I had my hand on the door of the time globe to run to his assistance when my ears detected a great rumbling noise. Looking up I saw the huge glacier crack and peel. Simultaneously came the voice of Doctor Hopkins over the radio—

HOPKINS: (*On Radio*) The concussion of the explosion broke loose a portion of the glacier. Throw your control over to positive full—I'll try to save Hughes.

CARMAN: Almost mechanically I did as I was instructed and I felt the machine respond. The walls of the globe began to dim and my senses dulled, but before I lost sight I saw a scene that I will carry with me to my grave. Dr. Hopkins was dragging the inert figure of Bill Hughes toward the time machine as a hundred million tons of ice crushed them!

ORCHESTRA: (*Climax Chord and Out*)

CAST VOICES: (*Startled Exclamations*)

KIRKMAN: Alex—had we not seen the living proof of your story on the screen tonight, I for one would be inclined to call the authorities to take charge of you.

CARMAN: I am grateful for your confidence.

SPENCER: The other time machine,



where is it?

CARMAN: When I returned to the present I was stunned by my experience. I stumbled out of the machine and into the street, where I hailed a car. That night the news came that Dr. Hopkins' laboratory had been destroyed by fire. I had forgotten to make the disconnections Dr. Hopkins had instructed me to make.

KIRKMAN: Alex, you have done a marvelous thing. You have produced the world's greatest picture.

CARMAN: You're wrong, Sam. Life itself produced "Outline of History"—we only recorded it. And I am happy to tell you that World Wide Films does not intend to profit by this great mas-

terpiece.

SPENCER: How's that?

CARMAN: As soon as the original investment is returned, the picture will be distributed free to schools, colleges, churches and civic bodies to be used as a living monument to two great men,—Dr. Charles Hopkins, who discovered the doorway to history—and Bill Hughes, who made it immortal!

ORCHESTRA: (*Up to Full and Finish*)

EDITOR'S NOTE: The following dispatch was reported by the Reuters (British) News Agency, date of July 1st, 1939, under the heading "Scientific Mystery." We quote in detail: "Archaeologists of the Hamilton-Wayne Foundation, engaged in uncovering rel-



(CONTINUED ON PAGE 141)

GREG BENFORD & DAVID BOOK:

The SCIENCE in SCIENCE FICTION *



COLOR THE SKY —

"Daddy, why is the sunset green?", the boy asks his father as the two stand tentacle in tentacle in a field on Tau Ceti V. His father's eye brightens with pride at this mark of the boy's intellectual curiosity. Then pride gives way to sudden apprehension. He doesn't know the answer to the question.

Earthly fathers have known moments of similar distress, but the problem is much worse on Tau Ceti V. There, the range of meteorological phenomena is much greater than on Earth. This is because Tau Ceti V is a completely hypothetical planet, so that we can imagine conditions there to be whatever we wish. In order to discuss green sunsets and similar occurrences on other planets around the galaxy, it's a good idea to begin with their analogs here on Earth. Most of our readers are Earthmen, anyway, so there's no harm in being specific.

The first fact about air, the one everyone

knows, is that air is a colorless gas. But if this is so, why do we have blue skies, white clouds, red and orange sunsets, rainbows, auroras? If you had never seen a planet with an atmosphere before and someone described the composition of Earth's atmosphere to you, would you have predicted all these effects? An sf writer who postulates a new planet as the setting of his story finds a similar problem.

Earth's atmosphere extends hundreds of miles out into space, becoming increasingly rarefied until it is indistinguishable from the sparse gases drifting between the planets. Its total mass is almost six million billion tons. It has dozens of distinct constituents, but most exist only as traces. If the whole ocean of air were somehow packed down so as to maintain all of it at sea-level pressure and room temperature, it would be about eight kilometers (five miles) deep. Further, if there were some way to separate the various components into layers, one for each different gas, they would have the following thicknesses:

Table 1

Nitrogen	6.24	kilometers
Oxygen	1.67	"
Argon	75	meters
Water	8 to 200	"
Carbon dioxide	2.6	"
Neon	15	centimeters
Helium	4.2	"
Methane	1.2	"
Krypton	.91	"
Sulfur dioxide	1	"
Carbon monoxide	.05 to .8	"
Hydrogen	.04	"
Nitrous oxide	.4	"
Ozone	.25	"

and traces of others. Since a kilometer is a thousand meters or one hundred thousand centimeters, it seems that only the first four entries in the list are important. But, as in French cuisine, the small touches make all the difference.

With the exception of ozone, which is faintly bluish, all of these gases are invisible. The human eye is a light detector, responding to wavelengths between 4000 and 8000 Angstroms. (Ten thousand Angstroms—abbreviated 10^4 A—equal one micron, and 10^6 microns equal one meter. So we can say alternatively that the eye's range of sensitivity is .4 to .8 micron. The paper this is printed on is about 100 microns thick. The response of this detector is energy dependent: the more intense a signal of given wavelength is, the stronger becomes the observer's impression of the color associated with that wavelength. The colors and the wavelengths match up like this:

Table 2

Violet	3900 - 4220 A
Blue	4220 - 4920
Green	4920 - 5350
Yellow	5350 - 5860
Orange	5860 - 6470
Red	6470 - 8100

Wavelengths shorter than 3900 A are called ultraviolet; those longer than 8100 are called infrared. Eye sensitivity is greatest around 5600 A, dropping off to zero toward the violet and red extremes. (But a few people can see well down into the ultraviolet, to about 2500 A; they report that such light looks purple—quite a letdown, after Lovecraft's "Color Out of Space." On the other hand, some people can detect radar wavelengths, around 10^3 microns. The process, which isn't understood, is not "sight", but may involve the optic nerve.)

Ordinary daylight is a mixture of the colors of the visible spectrum, sometimes called white light. An object seen outdoors looks, say, yellow if the light coming from it has relatively more energy in the yellow than in the other colors compared with white light. This can happen if it emits yellow light, or if daylight is reflected from it in such a way that the yellow components are reflected more effectively than the red, orange, green, etc.

If an object seen by transmitted light—for example, a smog layer or a piece of stained glass—looks yellow, this is because the other wavelengths are preferentially absorbed in passing through it. Yellow light gets through more efficiently than others, and so the transmitted light looks yellow by comparison with white light. There is nothing special about yellow, of course; similar remarks apply to the other colors.

The source of the light seen in all the common atmospheric optical effects is our sun. The sun emits energy at an almost constant rate, so that two calories per square centimeter per minute reach Earth's atmosphere. Most of this energy is in the visible spectrum. If the energy per unit wavelength is plotted, the resulting curve looks like that for a "black body" at 6000 °K, with some irregularities (Fig. 1). A black

body is an ideal object, a theoretical entity. But most real objects radiate energy over a spectrum of wavelengths more or less like that of a black body.

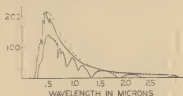


Fig. 1.

Intensity of Sunlight. (Kilowatts per square kilometer per Angstrom.) Lower curve shows energy reaching Earth's surface; upper curve shows energy reaching upper atmosphere. Dotted line represents output of "black body" at 6000° K.

The radiation that penetrates the atmosphere is described by the third, rather chewed-up curve. It shows that practically nothing gets through under 3000 Å, while much of the infrared portion is blocked as well. Since the longer wave radiation is less energetic ("softer"), almost all of the solar energy that penetrates our blanket of air to where we live is in the visible spectrum. This is no accident—evolution has adapted our eyes to make use of the available sunlight. Enough gets through per square yard every ten minutes to vaporize a pint of water.

The radiation that fails to get through is absorbed by air molecules. The important ones for infrared absorption are water and carbon dioxide. At short wavelengths, oxygen and ozone are responsible for almost all the ultraviolet light which is screened out. From 2200 Å to 3000 Å, ozone alone is responsible, although it occurs at the rate of less than one molecule in ten million in the air, concentrated at an altitude of about fifteen miles above the Earth's surface. If it

weren't for that ozone filter, we would be sunburned to death in a few hours.

The rest of our air (including nitrogen, which makes up four-fifths of the total volume) absorbs no sunlight on its way to us. A gas like chlorine (often suggested as an alternative to oxygen by sf writers) is another matter. Chlorine is greenish yellow, because it absorbs light preferentially in the blue and red-orange wavelengths. But there is also substantial absorption in the middle wavelengths. Chlorine atmosphere more than a few meters thick would transmit no visible light. If the hypothetical inhabitants of Tau Ceti V should happen to be chlorine breathers, they must have evolved in what we would regard as total darkness. What light they actually see by would depend on the solar spectrum of Tau Ceti (which is much like ours) and the other ingredients of their atmosphere.

What color is Tau Ceti V's sky? Well, take Earth: why is our sky blue? The answer does not lie in the air's absorption properties, but in a process called scattering. As Tyndall and Rayleigh discovered a century ago, a light wave passing through a transparent medium containing particles smaller than the wavelength of the light suffers occasional small deflections. These deflections are random if the particles are randomly located—as they are in an atmosphere—and the probability of deflection grows as the distance traveled increases. Further, the shorter wavelengths are scattered more; the rate at which light is deflected out of its original path varies inversely with the fourth power of wavelength.

It is simple to apply this to sunlight. As the sun's rays pass through the air, they are scattered by air molecules; a little of the red light, more of the yellow and green, and a lot of the blue and violet are scattered. The scattered light appears to come not from the

sun but from the air all about, that is, from the sky. Since our eyes are more sensitive to blue than violet, the sky looks blue. And because short wavelength light is scattered out of the direct solar rays when we look straight at the sun, the sun seems redder than it would in outer space.

This "Rayleigh scattering" occurs only when the scatterers are smaller than a wavelength. As the scatterers increase in size, the dependence on wavelength diminishes. For particles as large as a wavelength or bigger (one micron in radius), all wavelengths are deflected equally. White light scattered by such particles still looks white. That's why ordinary clouds and fog (where the water droplets are bigger than the wavelengths of light) look grey or milky.

On a clear day, one cannot see forever, but only about 280 kilometers. That is the distance light in the middle of the visible spectrum can travel through perfectly clean dry air before absorption and scattering weaken it substantially. Actually, because of the Earth's curvature, there is no place where one can find a line of sight 280 kilometers (170 miles) in length lying in the lower atmosphere. But if there were, it would not be "clear." Even over deserts there is a thin water haze which cuts down on visibility. In addition, there is a certain amount of dust present everywhere. Locally, this may arise from wind storms over deserts, salt sprayed by ocean waves, or pollution. Over the whole surface of the Earth, though, most dust is produced in volcanic eruptions. This dust component is responsible for scattering and absorption effects comparable with those due to molecular scattering and absorption.

Above each square mile of the Earth's surface, on the average, there are about one hundred pounds of volcanic dust. This figure is frequently dwarfed by the

quantities of pollutants spewed into the air above cities and factories, which are sometimes measured in tons per square mile. Though smog and smoke particles can effect dramatic changes in local climate, their total amounts are so small that they are only beginning to have world-wide climatic effects. (If Tau Ceti V is inhabited by a runaway technological society, though, its air might be a rich ruddy-brown.)

The most dramatic visual effect of atmospheric dust is in coloring sunsets. Small dust particles scatter light according to the Rayleigh theory. When the sun is close to the horizon, its rays travel perhaps ten or twenty miles through the dense lower layers of the air. Instead of the slight scattering which occurs when it is overhead, there is almost complete diversion of the blue wavelengths. The other wavelengths are attenuated, too, though not so strongly, so that the sun appears relatively dim and very red. Clouds near the horizon are painted pink or crimson, or the sky near the sun may be yellow on account of the same Rayleigh scattering, now operating to separate the shorter wavelength yellow light from red.

What's it like on Tau Ceti V? The answer begins with the nature of the local sunlight. Hot stars radiate mainly blue or ultraviolet light; cold ones put out red or infrared. Well, Tau Ceti is a near twin to Sol, so any important differences must come from Tau Ceti V's air.

A planet with free oxygen in its atmosphere (from which ozone will be formed by the absorption of short wave radiation) will be protected from irradiation by ultraviolet light. If water vapor or carbon dioxide is present, most infrared will be screened out as well, and the sunlight will resemble that on Earth. But if the atmosphere has several times as much oxygen, then it will absorb most of the blue

and yellow sunlight, and only an eerie red will reach the surface.

Aside from the hydrocarbons and some hydrogen-carbon-chlorine compounds, there are only a few substances which are gaseous at temperatures like those we are used to. Some of them, like the inert gases and nitrogen, are very weak absorbers. Most of the others absorb only at infrared wavelengths. For the remainder, the absorption at visible wavelengths is so weak that no one has ever measured it accurately. We know, for example, that ammonia and methane tend to absorb red light and pass blue and yellow. (Uranus and Neptune, which both have considerable quantities of methane in their atmospheres, tend to look blue-green through a telescope.) But it is hard to be more precise than that. If Tau Ceti V is a methane planet, the sun might appear green while the sky would still be blue.

A planet having the same sort of atmosphere as our own, but orbiting a cool red star, would get comparatively little blue light. From the surface, the sun would appear cherry or wine-red even at midday, while Rayleigh scattering would make the sky green or even yellow. Quite a freaky place!

If we consider the organic compounds like formaldehyde, etc., and others like hydrocyanic acid and silane, it becomes even harder to be sure what happens. There has never been any reason to carry out long path length absorption experiments with them, since they are not known to occur in planetary atmospheres anywhere (though formaldehyde has been observed in interstellar space).

Speculation about color effects in completely hypothetical atmospheres is rather pointless, though. For one thing, it leaves out the important effects of

atmospheric dust and aerosols. These make for spectacular effects right on our own planet.

For instance, after every major volcanic eruption unusual lighting in the sky and especially beautiful sunsets occur for several months or years. After the great eruption in Iceland of 1783, the sun and moon appeared "as red as the juice of cherries." Similar spectacles followed the eruption of Babuyan (1831), Krakatoa (1883), Pele (1902), and Katmai (1912) all over the world. They are caused by the joint action of haze and dust. Scattering by volcanic dust also causes the "Bishop's ring," a reddish ring around the sun with radius of about 30°.

On September 23, 1950, great forest fires raged through Alberta. Oil droplets arose from distillation of the wood in the heat of the fire. On the following days, the sun appeared in Ontario and then in Europe to have a deep indigo color. Smoke particles and oil droplets of radius .5 micron scattered red and yellow light preferentially, reversing the effect of the usually Rayleigh scattering. A "blue moon" can occur because of dust or smoke at high altitudes. This phenomenon is reported with a fair frequency in Jamaica.

Similar materials make up much of the contents of urban smog cover, although "smog" may denote several very different conditions. Smog droplets and particles have a wide range of sizes, but a typical average radius is .2-.3 micron. The characteristic brown color of the true connoisseur's Los Angeles-type smog layer is not caused by scattering but by absorption, most of it due to the presence of reddish brown nitrogen dioxide. (This is one atmospheric gas that is *not* colorless, odorless, or tasteless.)

There is another way in which dust and liquid drops suspended in the atmosphere are important. That is in connection with

the heat balance of the Earth. Of the solar radiation striking the Earth's atmosphere, 40 percent is reflected and the rest is absorbed. The absorbed fraction, plus heat from radioactive materials in the interior and from the cooling of the core, act to maintain the surface at the temperatures we like. The Earth radiates heat away so as to just balance the input. This radiation is (once again) of the black body sort; only, because the Earth's surface is at about 300°K or a bit more, the radiation spectrum peaks far out in the infrared—at around 10 microns.

If the atmosphere were missing, this infrared radiation would go blasting out into space and the Earth would cool to Arctic temperatures. But because water vapor and carbon dioxide are such good infrared absorbers, the air acts like an insulating blanket. This is sometimes known as the greenhouse effect. Actually, though, the interior of a greenhouse stays warm for a different reason. Sunlight passes through the glass walls and roof and heats the air inside, which tends to rise. Because the glass is solid, the hot air cannot go anywhere, and so the heat stays inside. While it is true that glass is fairly opaque to infrared radiation, this has nothing to do with the matter. A greenhouse of rock salt panes (which are transparent to infrared) was built in 1909 and worked just as well.

There is so much water in the oceans (which average two miles deep) that nothing man does can change the amount of water vapor in the air very much. On the other hand, the oceans contain only about 60 times as much carbon dioxide as does the air, and man can affect that. The ocean acts as a reserve or buffer; if the amount of atmospheric carbon dioxide decreases, it is replaced with an equal amount from the seas, while if it increases, the excess eventually dissolves back into them. Given

enough time, it might be transformed instead into forests or coal deposits, but this takes millions of years. Even the oceanic buffering effect is pretty slow. But human technology in the last century has taken to burning coal, oil and wood at such a tremendous rate that the amount of carbon dioxide in the air has increased by a few percent. This has the effect of making the atmosphere a more efficient insulator, which would lead one to expect systematically warmer climates to arise.

But that's not the whole story. Technological "progress" has also led to atmospheric pollution, increasing the amount of smoke, smog and dust in the air. The typical size of pollutant particles is one or two microns. That's large enough to reflect incoming solar radiation back out to space so that it never reaches the surface, but small enough so that outgoing infrared rays are only scattered. This means that heat would be lost, and we could expect temperatures to drop.

So far, the net change is unclear. A lot of people, however, are understandably reluctant to prolong the experiment until a definite result appears.

Science writers have long used the "greenhouse effect" to justify giving their planets tolerable or even balmy climates. For example, in *Farmer In The Sky*, Heinlein invokes a mysterious "heat trap" to explain how Ganymede's tepid sunshine keeps this frontier planet warm. When the power stations fail suddenly, the trapped heat leaks away in a hurry, leaving everyone out in the cold.

Heinlein never spells out just how his heat trap works. It couldn't depend on infrared absorbing gases (like Earth's), because power stations wouldn't have been necessary to keep it going. But a design like a real greenhouse might do the job. Just wrap Ganymede in a bag; a thin, spherical

plastic sheet that rests on top of the atmosphere and keeps the gases in like the skin of a balloon. It would be dynamically stable even if holes 20 miles across were cut to allow rockets to go in and out. Laying it out might be a problem—but we leave that to Mr. Heinlein's renowned ingenuity.

We already know one planet that seems to have both a greenhouse effect and a natural smog bank: Venus. It's almost the same size as Earth and has a surface temperature of 750 °K (800 °F) and a sea level pressure perhaps 100 times greater than ours. Its atmosphere is composed almost entirely—at least 95%—of carbon dioxide, with at most a trace of water and oxygen. Thick yellowish-white clouds sit at the top of Venus' atmosphere. Their composition and extent is unknown, although there are indications that they contain droplets or particles of one micron radius.

In all probability, the clouds are opaque to sunlight all the way down and the surface of Venus is in darkness. If the clouds were absent, however, there would be a number of novel optical effects awaiting the first explorer on Venus. Rayleigh scattering would be very exaggerated; all light, red, yellow, and green as well as blue, would be strongly scattered and the sky would be white. Away from the zenith, the sun would be visible only as a faint red disk in a white sky with a bluish tinge, or it would be undetectable. If the atmosphere is thick enough, scattered light might make nights as bright as days.

If the sun can be seen, it must appear squashed and flattened by refraction. This is an exaggeration of the same effect in the setting sun seen from Earth, and has the same explanation as the apparent kink in a rod stuck part way into a pool of water. Light travels slower in a denser medium, three-fourths as fast in water as in air and slightly slower in air near sea level than at

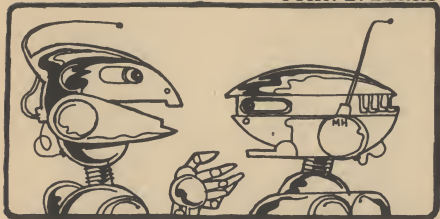
high altitude. But a ray always follows a path so as to minimize the time needed to travel between its two end points. This means that in the atmosphere, a ray is always bent upward in the middle of its trajectory. The farther it travels or the denser the air is, the greater is this bending or refraction. A ray from the top of the setting sun goes through less dense air, and so is bent slightly less than one from the bottom. So the top and the bottom of the sun appear farther above the horizon than they really are; but the bottom is raised more than the top, which leads to a flattening in appearance.

On Venus, the setting sun would be squashed like a huge dish facing upward. The horizon, too, would be concave upward so it would look as though you're standing at the bottom of a huge bowl. Besides this, different wavelengths are bent by different amounts: red least of all, yellow and green more, blue and violet most. So the setting sun (if it can be seen on Venus) would be red at the bottom and orange above that. Since yellow, green, blue and violet wavelengths are scattered so strongly, the top of the sun will be only a greenish smudge.

The analog of this effect on Earth is the "green flash." In very clear skies (usually over the ocean), as the last edge of the sun drops below the horizon, a brilliant green jewellike flash, lasting less than a second, can occasionally be seen. Its explanation is well known. The sun has already gone below the horizon. Red light, being insufficiently refracted, can no longer reach the observer. The same is true of yellow light. Blue and violet wavelengths are effectively scattered away, so that the green light makes a vivid impression. Then the sun sinks a bit further and the green also is gone.

Would Tau Ceti V have a green flash? Of course, if there's not too much dust. In fact,

(CONTINUED ON PAGE 145)



* THE CLUBHOUSE

SPECULATION #24, Sept., 1969; 35¢ or 3/\$1 (no checks); irregular, from Peter R. Weston, 31 Pinewall Ave., Kings Norton, Birmingham 30, ENGLAND; 54 pp., mimeographed.

This issue of SPECULATION is given over almost entirely to a symposium on "Robert A. Heinlein: After 30 Years," which was conceived because last August marked the 30th anniversary of Heinlein's first professional publication (the story was "Life-Line," and it appeared in *ASTOUNDING*). A run-down of the contributors to the symposium gives some idea of the potential present for a brilliant collection of critical essays: Harry Harrison, Fritz Leiber, Algis Budrys, Daniel F. Galouye, John Brunner, Richard Gordon, Brian Aldiss, Robert A. W. Lowndes, Harlan Ellison, Harry Warner, G. D. Doherty, Ken Bulmer, F. M. Busby, Poul Anderson, M. John Harrison, Jack Williamson, and Norman Spinrad. The reality is, with very few exceptions, excellent. I had the horrible feeling that

discussions of the most talked-about science fiction writer would sound terribly hackneyed and boring, but it appears that each contributor thought of this and confined himself to only such points as he thought would be new and interesting. (To be honest, I'm sure Pete Weston's editing is a large part of what created this impression.) There are wildly varying opinions here, from Daniel Galouye's unadulterated praise of his friend Bob Heinlein to M. John Harrison's brief broadside against Heinlein as the ogre behind all that's wrong with America. It's a wonderful collection of critical and speculative writing, and what makes it so good is that each writer presents *different* insights into Heinlein and his work. There's very little repetition here. All the entries are new, except for Doherty's piece and Busby's, which were reprints from 1964 and 1962 respectively. The best essays are probably those of Brunner, who questions the direction of Heinlein's work in relation to the direction of society; Aldiss, who says Heinlein is "a very foreign writer"

to an Englishman; Warner, whose analysis of style is fascinating; and Busby, who gives a damn fine defense of Heinlein's often-criticized preference for competent people over the incompetent. G. D. Doherty's piece is interesting in contrast to Warner's, since they both deal with style but with radically different judgements on Heinlein's application of such, but Doherty doesn't go on at any great length. Williamson's and Lowndes's bits are the two that most demand expansion and elaboration; Williamson for leaving all kinds of oversimplifications and provocative comment-hooks, and Lowndes for only touching on the relation of his admiration for Heinlein to his implied hard-nosed, conservative political beliefs. And Algis Budrys is remarkable for using logic reminiscent of the medieval scholastics to "prove" a series of points that remain as unproven at the end as at the beginning (I say this despite being basically in agreement with him from the start).

Besides the symposium proper, there's a column by Chris Priest and the usual lettercolumn. Priest bows to the occasion by telling an anecdote of his own early discovery of Heinlein, but that's not the main thrust of the column. He spends four pages discussing a literary conference he recently went to, and according to Chris it was a general disaster, with nothing of any consequence said except for some entertaining invective from Norman Spinrad. I wonder, though, about Chris's insistence that "unlike any other profession which meets in conference . . . when writers get together there is very little to say to each other about writing." I don't know what the British National SF Conventions, nor if Chris has ever attended any (although I think he has), but at American worldcons there have been a great many utterly fascinating discussions of writing and the sf

field by its writers, prominent and otherwise. Admittedly, there's always a lot of dead air, too, and plenty of boring, repetitious arguments, but some fine stuff has also come out. Most of the best appears in individual speeches, although occasionally something outstanding comes out of panels or dialogues too. At any rate, Chris's column is well written and entertaining, and I'm glad to see this calibre of writing appearing in a British fanzine from a British fan.

The lettercolumn epitomizes the whole nature of SPECULATION. The fanzine's lifeblood is discussion and argument, yet Pete deplores controversy simply for the sake of making a lot of noise; as a result, the orientation of SPEC is less toward pyrotechnics than that of the prime American fanzine of sf criticism, SCIENCE FICTION REVIEW, or any of its many imitators. In this realm, at least, I think SPECULATION is by far the superior fanzine. *Highly Recommended.*

OSFAN vol. 2, #2-3, Dec., 1969, and Jan., 1970; 15¢ or 12/\$1.50; monthly, from Douglas O. Clark, 6216 Famous Ave., St. Louis, Mo. 63139; 10 and 14 pp., respectively, mimeographed.

It's sad to see a good fanzine deteriorate. Admittedly, a clubzine is especially prone to this, but it's sad nonetheless. OSFAN is the official newszine of the Ozark Science Fiction Association; as such it began as something strictly of interest to local fans, then it developed under Hank Luttrell's editorship into a useful, well-written monthly newszine with news of all of fandom. The current numbers are the first issues I've seen in almost a year, but it appears that since Hank quit editing the zine, it fell to whoever would accept the job to get it out. Now Doc Clark is an amiable guy, but he can't edit a fanzine. These two

issues contain virtually no news except an announcement of when the next OSFA meeting will be. Mostly they consist of page after page of long-winded reports of various parties in St. Louis fandom, at most of which Doc seems to have spent his time making advances to every eligible female present and several ineligible ones. All this is written up at great length; the writing is purple prose at its best, overwritten and extra-elaborate, and while I'm sure Doc had a lot of fun writing it nobody really wants to read it.

Vol. 2, #3 also features a brief report on the current state of British fandom by Darroll Pardoe (sparse, but interesting) and an editorial by OSFAN's ostensible editor (Clark is officially "publisher"), Chester Malon, which reads like the worst I-have-nothing-to-say-but-I-have-to-fill-up-this-space material. There are some silly cartoons and not much else.

I hope producing this is fun for the participants, because it certainly has few other merits. A long step down for a once-good newszine. *Forget it.*

WINNIE vol. 4, #3-4, & 6, Dec. 1, 1969, through Feb. 1, 1970; 6/\$1; bi- or tri-weekly, from Mike Ward, Box 85, Mountain View, Calif. 94040; 2, 4, and 4 pp., respectively, mimeographed.

Here's an example of a decent newszine; modest, but reasonably good. WINNIE began as WINNIE THE POO, the official organ of the (San Francisco) Peninsula Science Fantasy Association ("THE POO" came from "PenSFA Official Organ"), and its prime function was to announce future meetings. When the club went into hibernation, Jerry Jacks took over WINNIE and tried to make it into a West Coast newszine. His attempt failed, but last winter Mike Ward took over the fanzine and has succeeded where Jerry didn't.

The news in WINNIE is usually rather dry, but competently written, and Mike is beginning to develop his own news sources and to stop relying on reprinting news from LOCUS. Included with most issues is THE FRIED HAT REVIEW, in which Mike reviews books or whatever he feels like reviewing; this is in the tradition of Andy Porter, who used to include an occasional SF CRITIC with his SF WEEKLY a couple of years ago. Also with the latest issue is a progress report from the committee of SFCon 70, the new Bay Area regional conference planned for Oarch. *Recommended if you're a West Coast fan.*

NAPALM #6-7, Nov., 1969, and Jan., 1970; 15¢; irregular, from Wally Conger, Route 1 Box 450-A, Arroyo Grande, Calif. 93420; 10 & 8 pp., respectively, mimeographed.

NAPALM is "a fanzine of opinion and argument" that contains mainly letters, with a short editorial at the back. It's unpretentious and rather nice, as Wally is trying to inject more fannishness into it and get away from the stock political arguments that characterized the first few issues. (Young fan editors have a tendency to discover somewhere along the way a Political Awareness and begin filling their fanzines with intense arguments on such burning issues as Censorship, Social Unrest, and the like. I did it myself, so I know. They tend to push for controversy above all else, and to anyone who's seen this happen more than once, all the arguments look about the same. Later, of course, the same people may write very intelligently on the same subjects, but their first flash of red-hot enthusiasm is usually boring for everyone but those to whom it's new.)

The format is simple and pleasant. Wally plunks in a Rotsler cartoon as heading and a short colophon, then fills a half dozen or so

pages with letters, interspersed with an occasional cartoon, and closes off with a brief editorial comment on the last page. An effective format, with the emphasis on content. I could wish for more material by Wally himself, but in general the fanzine achieves a hang-loose atmosphere that encourages one to write to it.

In #6 Wally issued a plea for 'more fannishness and less formal argument; in #7 a few writers respond by writing rambling, personal letters and getting away from political/moral issues. I suspect that the old Controversies are disappearing, although a "guest editorial" by David Gerrold in #7 might keep things going for a while. One person, Paul Moslander, even gives a new slant on the old censorship argument by talking about the effect BIRTH OF A NATION had on this country in the early years of this century. I suspect that in a couple of issues NAPALM will be a very interesting, informal fanzine. *Recommended.*

QUIP #13, Oct., 1969; 50¢ (no subscriptions); irregularly bimonthly, from Arnie Katz, Apt. 3-J, 55 Pineapple St., Brooklyn, N.Y. 11201; 44 pp., mimeographed.

QUIP illustrates a problem plaguing a lot of fanzines these days, especially the fan-centered ones that don't contain articles on topics of wide interest like sf books or social trends or what-have-you. The problem is lack of response in the form of letters, and since letters are the lifeblood of a fanzine, this is not a healthy sign. I think, though, that the problem is not as universal as Arnie claims, when he tells me that QUIP 12 drew a grand total of about three letters. For QUIP, you see, is a special case. In 1968, Arnie finally lost the last of his long line of co-editors and began editing the zine himself, and he put out a string of excellent

issues at fairly frequent intervals and built up considerable letter response. At the beginning of last year, however, he stopped publishing for several months. He finally resumed with QUIP 12, which appeared last summer and promised renewed regular publication. But then he didn't publish again. #13 was finally stenciled in October, but Arnie was so discouraged by the lack of response to the last issue that he didn't get the bulk of the copies of #13 in the mails until January or later. His discouragement is understandable, but not justified. Each issue of QUIP appears late, and in each issue Arnie promises that the next one will be out by a date that is past by the time you get the current issue. Who is going to respond to a fanzine each of whose issues appears to be alame-duck issue? It seems to me that some semblance of regular publication is necessary in order to build up response—and that doesn't just mean promises, but an actual string of consecutive issues behind you and reason to believe they will continue into the future.

What makes this particularly sad is that QUIP #13 is easily the best fanzine to come out this winter. Arnie's writing has gone from good to excellent, and his editorial is one of the best I've seen lately, skewering several current trends in fandom and entertaining at the same time. Former co-editor Lon Atkins contributes a fine column in which he applies the gentle art of exaggeration to a devastating description of his four months in glorious Dallas, Texas. Harry Warner and Greg Benford contribute good installments of their excellent columns, Harry delving into fanhistory and Greg incisively reviewing current fanzines. Arnie presents another of his very fine stories based on fictional fannish characters, "The Fans From Yesterday"; this time the emphasis is not so much on the plot as on delving happily into an extrapolation of

current fannish myth and humor. There's also a column by me, a cartoon feature done by Jay Kinney ad me, and a reprinted piece by Charles Burbee that's in the best Burbee tradition. The lettercolumn is short, containing more letters on QUIP #11 and illustrating well the lack-of-response problem. On the whole, the issue contains some fine writing and the best layout the zine has seen in a long time. Yet no one writes letters, and as a result QUIP may die. I hope conditions improve, and in the meantime QUIP is still one of the best fanzines you could get. *Highly Recommended.*

Other Fanzines:

The fanzines marked with an asterisk (*) are especially recommended.

*CRY #185, Nov., 1969; 40c (5 issues maximum subscription); six-weekly (?), from Vera Heminger, 30214 108th Ave. SE, Auburn, Wash. 98002, with co-editors Elinor Busby and Wally Weber; 38 pp., offset.

*DAVID MALONE'S SCIENCE FICTION FANTAZINE #3, Feb., 1970; \$1.00; irregular, from David T. Malone, Bacon Road, Roxbury, Conn. 06783; 38 pp., mimeographed.

YORIC #2, Sept., 1969; 25c; irregular, from Ted Tom, 3434 Knollbrook Way, Corvallis, Or. 97330; 36 pp., mimeographed.

MAYBE #3, Feb.-Mar., 1970; no price listed; irregular, from Irvin Koch, Apt. 45, 614 Hill Ave. SW, Knoxville, Tenn. 37902; 22 pp., mimeographed.

*CROSSROADS #7, Jan., 1970; 25c or 12/\$3; monthly, from Al Snider, Box 2319, Brown Station, Providence, R.I. 02912 (home address during summer: 1021 Donna Beth Ave., West Covina, Calif. 91790); 36 pp., mimeographed.

HAVERINGS #42, Jan., 1970; 6/\$1; bimonthly, from Ethel Lindsay, Courage

House, 6 Langley Ave., Surbiton, Surrey, ENGLAND; 8 pp., mimeographed. A fanzine composed of Ethel's comments on other fanzines.

SF BULLETIN #1, Jan., 1970; 30c or 12/\$3; monthly, from SF BULLETIN, Riverview 303, 221 Mt. Auburn St., Cambridge, Mass. 02138; 8 pp., offset. A monthly listing of new sf book releases.

ANOMALY #1, Nov., 1969; 75c; irregular, from Jan Steven Strand, 2540 Aloma, Wichita, Kan. 67211; 32 pp., offset. An attractive magazine that's trying to bridge the gap between comics and science fiction.

SF COMMENTARY #6, Sept., 1969; 40c or 9/\$3 Australian; irregular, from Bruce R. Gillespie, P.O. Box 30, Bacchus Marsh, Victoria 3340, AUSTRALIA; 46 pp., mimeographed.

GRANFALLOON #8, Jan., 1970; 60c, 2/\$1, or 5/\$2; irregular, from Linda E. Bushyager, 5620 Darlington Rd., Pittsburgh, Pa. 15217; 58 pp., lithographed.

RETURN TO WONDER #7, Nov.-Dec., 1969; 50c (#8 will be offset and will cost 40c); irregular, from Stephen Riley, 18 Norman Dr., Framingham, Mass. 07101; 64 pp., mimeographed. This issue, a special Robert E. Howard Tribute Issue, is probably completely sold out.

*LOCUS 48, Feb. 6, 1970; 5/\$1, 10/\$2, 20/\$4; biweekly, from Charlie Brown, 2078 Anthony Ave., Bronx, N.Y. 10457; 8 pp., mimeographed. The dominant newszine going, although it's filled with lots of facts and very little news.

ISFANEWS #3, Jan., 1970; 10c; monthly, from David Lewton, 735 esler Blvd., Indianapolis, Ind. 46220; 4 pp., multilithed. The official newsletter of the Indiana Science Fantasy Association.

—John D. Berry

Fanzines for review should be sent directly to John D. Berry, 35 Dusenberry Rd., Bronxville, N.Y., 10708



...Or So You Say

Letters intended for publication should be addressed to Or So You Say, c/o P.O. Box 73, Brooklyn, N.Y., 11232

Dear Mr. White:

I have been a science fiction fan for years, but I have very rarely seen your magazine on the stands in my area. I'm now looking for every back issue that I can get my hands on. What made me decide to do this is the content of your latest issue.

The Clubhouse column left me rather confused, however. As near as I'm able to understand, a fanzine is a magazine either published by a science fiction fan or by a science fiction club for the betterment of science fiction in general. Obviously this is big business, but I'm still in dire need of an explanation.

I have a few questions:

1) Is there a science fiction fan club in my area, or would it be better to join a national club?

2) Is it a good idea to subscribe to a fanzine, and what are the advantages of doing so?

Dennis C. Elliott
1250 Duke St.

Preston, Ontario, Canada

The editorial in this issue should give you some background on the subject, but to elaborate: fanzines are amateur magazines, most often mimeographed (although a growing percentage are now offset printed), published either by individual fans or fan groups. While I wouldn't say that they are precisely conceived for "the betterment of science fiction," they do reflect the enthusiastic interest in sf of their participants. Most fanzines publish articles, essays, reviews, and columns of opinion, as well as news, fannish gossip and an occasional story. Although there are a great number of fanzines being published at any one time, it would be untrue to call them "big business;" most lose money for their publishers (fanzines are a hobby) and have a relatively low circulation of a few hundred or so. As for your specific questions, since fanzines can be obtained only by mail (there being no attempt at newsstand distribution), whether you send for a single copy or subscribe is a matter of individual preference. If you are just dipping your toe in, though, and want to sample a variety before fixing your interest on just a few, I

suggest you purchase single copies to begin with. I don't know if there is a local club in your area, but if there is, I hope the publication of your letter here will prompt them to get in touch with you. A local club allows you in-person socializing and conversation. A national club (like the National Fantasy Fan Federation) is limited to contact by mail.—TW

Dear Ron Archer (?), Norman Edwards, etc., etc.,:

Re AMAZING 3/70, pp. 131-132, comment attributed to TW: John Lange is the real name of John Norman: he is in no way related to Michael Chrichton, nor to the "John Lange" whose hand produced a series of suspense thrillers from Signet Books.

R. Reginald

Los Angeles, California

Hmmm . . . I appear to have been in error. Michael Chrichton is the "John Lange" of Signet thriller fame, and when I discovered a "John Norman" book copyrighted in the name of John Lange, I assumed a connection. You'll agree that John Lange is not the most common name in the world—one wonders what led Chrichton (the author under review) to pick that pseudonym? In any case, I stand corrected. (Oh yes: Ron Archer is my only professional pseudonym; Norman Edwards was the collaborative pseudonym of Terry Carr and myself.) —TW

Dear Mr. White:

One observation on the Benford & Book column in the January AMAZING: The statistics on the GNP percentages for Columbus' exploration and the current U.S. space exploration have an alternate interpretation. The column pointed out that we spend 100 times more of our GNP on our program than Spain did in 1492 and still we get back only a fraction of our expenditures

while Spain got back six times their 1492 GNP. This can be viewed as an argument against the merits of direct, manned exploration as we know it. Conceivably the cost could rise to the point where such exploration would actually exceed the GNP. If an increase of 100-fold per 500 years is a pattern then our exploration around year 3000 will consume 40 times the GNP at that time. Perhaps the rate of increase is geometric rather than linear, an even more pessimistic view. Of course this is merely conjecture and can be discounted as such if one likes.

As much as I enjoyed the Benford and Book column, I feel that perhaps in the future some time could be devoted to the arguments against the feasibility and possibility of direct exploration for above the planetary level and the resulting consequences. The talents of Benford and Book could undoubtedly shed a great deal of light onto this aspect of future science.

W. Kin Heron

19345 Littlefield

Detroit, Mich., 48235

The differences in technologies necessary for exploration make any real projection of the different costs reflected in the 1492 voyage of Columbus and our present space program impossible. Columbus after all did not have to invent an entire life-support system for survival in an environment totally hostile to human life. It seems likely to me that if space travel is ever to get past its embryonic stages it will have to overcome the cost factor first. The most likely way will be some new technological breakthrough. And of course there is no way we can at present base our projections on this as yet undiscovered breakthrough.—TW

Dear Ted:

Jerry Kaufman is very much confused. If the "Faust" element in sf is so old, all the

more reason to object to the New Waveicles promoting it as a New Thing.

But Dr. Asimov is no Faustian. His robot stories were expressly written to repudiate the "Faust" tradition. And his few pessimistic stories, like "Nightfall," are exceptions. One must view a writer's total output to gauge his attitude toward humanity and the universe.

As for "The Cold Equations," Kaufman completely misinterprets it. Had Godwin thought human life insignificant, there would have been no tragedy in the story. All he was saying was that there's no such thing as a free lunch, and that human values must take into account the facts of the universe.

Justin St. John is not only confused, but hypocritical as well. He accuses me of making "package deals" and setting up "straw men." Yet he blithely characterizes the whole of "traditionalist" sf as being based on nothing but "ray guns," "magic swords," heroes with Hollywood looks and "WASPy names," and a disregard for "ideals and convictions."

This can only be called a vicious distortion of the best works of writers like Wells, Weinbaum, Heinlein, Asimov, Simak, Wyndham, del Rey, Leiber, Kuttner, Moore, Clark, Pohl and any number of other "traditionalist" writers—right down to Zelazny and LeGuin in our own day. To lump their classics in with "Flash Gordon" is stupid and contemptible.

St. John's hypocrisy is shown further by his efforts to claim Bradbury as a New Wave writer, when it is a well-known fact that Bradbury was writing more than twenty years before anyone ever heard of the term. "New Wave" was adopted about 1965 by Michael Moorcock (it was suggested, I understand, by Christopher Priest) to describe the pessimistic writings of Ballard and his followers at *NEW WORLDS*. The

term was popularized on this side of the Atlantic by Judith Merril, in relation to the same sort of fiction. In any case, no one but St. John has ever associated Bradbury with the New Wave—least of all Bradbury himself.

In my criticism I have linked the Ellison school in America with the Ballard school in England for the simple reason that they share the same anti-heroic, anti-rational outlook—whatever their stylistic differences, they both accept the "insignificance premise." I have never applied the New Wave label to writers who do not share this premise—I don't consider Delany and Lafferty to be New Wave writers, though I feel one to be too introspective for my personal taste and the other a plain bore.

St. John writes of an emerging "science of ethics" in the New Wave. But how can writers like Ballard, Disch, Vonnegut, Ellison, Platt, Bunch, and others who do not believe in a scientific approach to anything else offer us a scientific approach to ethics? Science fiction must be a rationalist literature to begin with before it can tackle ethical questions in a rational manner—the New Wave is excluded from this sort of analysis by its very nature.

(Don't you think you're arguing a bit too much from your own definitions, John? —TW)

And St. John also proclaims that sf must be concerned only with "this earth" in its speculations, ethical and otherwise. Where was he July 20? Has he not realized that the universe awaits us? He sounds just like Raymond Passworthy in Wells' "Things to Come"—content to have men remain "little animals" bound to a single planet. Wells knew better: man must create a new destiny for himself among the stars. Our eschatology must take all of existence into account—lest by default we become as

insignificant as Passworthy and St. John would have us. "All the universe—or nothingness," Cabal warned us.

Which shall it be, St. John? Which shall it be?

John J. Pierce
275 McMane Ave.

Berkeley Heights, N.J., 07922

Pierce explains his "eschatological approach" to science fiction in the Fantasy Fandom forum in the August FANTASTIC, out next month, for those of you who maintain an interest in this discussion. —TW

Dear Ted:

Did I say in my last letter that "A. Lincoln, Simulacrum" seemed to drag? The second half also dragged—it dragged me right inside the mind of the main character as he went insane! The hallucination scene was excellent, as was the entire novel.

As soon as I got the March AMAZING I read part one of "By Furies Possessed"—and now I have to wait *two months* to finish it. From now on, when you print a novel in two parts I'm going to wait until it's time for the second part to come out before reading the first half. (*Aren't you glad we never run our serials in more than two parts?* —TW)

There's been a lot of shouting going on in your letters section lately. The controversy seems to be over the relative merits of the "New Wave" vs. the "Old Wave". Personally, I am unable to detect much merit in any of this debate. Let's listen to a bit of it:

NEW WAVE SUPPORTER: Soon the day shall come when we will triumph over the bromide-hurling purveyors of formula fiction. The glorious revolution shall succeed! Long live romanticism!!

OLD WAVE SUPPORTER: Never shall we give in to the nihilistic advocates of

anhedonia. Science fiction and the sense of wonder will prevail, forever pure and unstained! Long live romanticism!!

NEW WAVE: Reactionaries! Floridation-fearing old-wave hacks!! Paranoid defenders of sterile plots . . . etc., etc.

OLD WAVE: New Wavicles! Effete corps of impudent snobs!! Radical polluters of our field . . . etc., etc.

Both sides sound a lot alike, don't they?

Despite the Old Wave's warnings, I don't see the "insignificance" premise spreading like a cancer and corrupting the genre. And despite the New Wave's assertions, I don't see the Old Wave as a stagnant pool of formula fiction.

What I'm saying is that nobody's wave has exclusive rights to all that is good and beautiful in sf. Each wave has its share of romanticism, and of nihilism, and hack writing. The boundaries between the waves are so nebulous that were it not so bitter, the whole debate would be ludicrous.

Yours for all the waves,

Michael Juergens

257 Florence St.

Hammond, Indiana, 46324

Dear Ted:

It looks like AMAZING is moving finally. It was over thirty years ago that I bought it regularly and these last thirty years—I couldn't have cared less.

Guess you'll be at the Midwescon this year?

The Twenty-first Annual Midwescon will be held the 26th, 27th, and 28th of June in 1970. The location is the Carrousel Inn, 8001 Reading Rd., Cincinnati, Ohio, 45237. The Carrousel's restaurant, La Ronde, is one of the 35 best rated in the country and there we'll hold the banquet. Write me if you have any questions.

Dale Tarr

6252 Starvue Dr.

Cincinnati, O., 45211

Thanks, Dale—I expect we'll be seeing you again this year; the Midwescon ranks in my mind at the top of the regional sf conventions. —TW

Dear Ted—

I am very impressed by the first section of "By Furies Possessed." It is a fine novel, so far, and I expect to derive much enjoyment from the second half. The characterization, especially, is good. I felt you were able to create the feeling of paranoia around Tad, which is, I am sure, a difficult job to do from his viewpoint. The other characters were distinctly different from one another, too. A common fault in fiction is to give one character a thousand different names and have him fight himself in these guises: that is, to have all the characters in the book share one basic personality. You do not suffer from this problem in your writing and your work benefits greatly from this.

I was also impressed by the realness of the world you created in the novel. We are often told this-and-that about the setting of a story, but who can really feel it to be true? In "By Furies Possessed," you have shown the world you are dealing with, rather than told about it. The air of reality prevades the story from the start.

There is only one complaint I have to make about the story: I haven't been able to make myself care about the main story-line. I have a mild interest in the doings of Bjonn, but I care far more about the life of Tad and his mild paranoia. You have given us plenty of meat to chew on—Tad's personality and a world where overpopulation has made eating a very private thing—but the skeleton plot is not strong enough to be worth more than a mild perusal after the meal.

I look forward to the conclusion of "By Furies Possessed" with great anticipation. I'm glad that episode of *Star Trek* irritated

you into writing it. "By Furies Possessed" may well turn out to be one of the things *Star Trek* will be remembered for.

Alex Krislov

3694 Strandhill Rd.

Shaker Heights, Ohio, 44122

But not, I'm afraid, by the Trekkies. By now you've read the rest of the novel and will have realized that my hand was faster than your eye: Bjonn was not the protagonist, nor were his "doings" the core of the plot. It only seemed that way at first. In preferring Tad you were actually following the real protagonist. Aren't you pleased to have been so perceptive? —TW

Ted—

Examining the letters that appeared in the March issue of AMAZING I find one by a Justin St. John. His highly contrived prose talks about the "new wave". There is no such thing as a "new wave." There are no little groups of authors writing about any one thing, harping upon it as did those weird poetry schools on the early part of the century. (*That is largely, but not entirely, true. Authors in this field do sometimes form cliques, and if any one magazine inspired such a clique it was NEW WORLDS.* —TW)

Another thing to make clear: I do not see where any one author clearly tries to duplicate the success of another author. Each writer is his own man. Each writer sets up his own standards of writing and what he writes about. Justin St. John blathers a lot about nothing—attacking the name of J.J. Pierce in the name of science fiction.

About Justin: he writes that he doesn't like to set up "The little straw men," and with a little prattle and noise blow them over. (SFR 30) Which he is doing in his letter to Pierce. Justin seems to be a lot of wind. His style shows it. He writes as if he were a college professor.

About Pierce: he probably would make a good critic if he were not so blind in his own terms.

Robert J. R. Whitaker
201 Liston Ave.

Wilmington, Delaware, 19804

What do you have against college professors? —TW

Dear Ted White:

Aha! Somebody seems to have goofed in your March issue—instead of printing the AMAZING column head at the beginning of your editorial, the FANTASTIC head was accidentally substituted. (*Would that all our goofs were no more serious! You're right: the editorial column heads were accidentally switched, and FANTASTIC for April used the AMAZING head.* TW)

I approached your new serial warily, since I'm afraid I found the last one too long and relatively uninteresting. But I was pleasantly surprised—and I hope it doesn't "bog down" in the middle, which I think was one of the main reasons I didn't like the Philip Dick novel. I guess I was a bit disappointed, too—I thought the novel was going to be (for the most part) about "A. Lincoln, Simulacrum"—not L. Rosen, Simulacrum! (But, of course, I realize that a title like that would ruin the surprise ending—which I thought was good!—yet the other title is a bit misleading . . .) (*I plead guilty to that; Phil's original title for the novel was "The First In Your Family." The meaning is obvious after you've finished the story, but I wanted a more evocative title and with Phil's permission coined "A. Lincoln, Simulacrum." I'm sorry you felt it deceptive.* —TW)

I've also noticed that the three novels you've published so far are all in the first-person—is this merely coincidental, or do you have a preference? (*Sheer coincidence.*

Witness "Orn." —TW)

Actually, for the most part I've liked your short stories better than the serials. "Breaking Point," by William C. Johnstone, was one of the better ones—I'm looking forward to more of the stories in that series! (That story—and "Sons of Man"—also destroyed my phobia concerning stories written around covers . . .)

Cy Chauvin
17829 Peters
Roseville, Mich.

Dear Mr. White:

At last AMAZING is on the way up, thanks to your wonderful editorial work. You have changed AMAZING from an old hat reprint magazine into a fresh, new story publication. The only thing about AS that I don't like is the small print, but otherwise everything else is fine. Why, though, don't you reprint some real classics, instead of the ones you are now running? Try to get things like E. E. Smith's "Skylark of Space," for instance.

William Max Miller
801 Salt St.
Saltsburg, Pa., 15681

We're limited in our choice of classic reprints by the space we can allot to them; a novel-length classic like "Skylark" is obviously impossible. Besides which, it is currently in print as a paperback. We try to avoid classics already restored to print. As for the type size, it represents our compromise with the number of pages we have to work with and the amount of material we want to publish. We could experiment with impressive graphics which limit the wordage to 150 words a page or so—as GALAXY has recently been doing—stretching short stories out to half the total length of the magazine, but we prefer to fight inflation on different grounds. We average 600 words a page, and

this allows us to present you with at least half a major novel ?"Orn" runs a total of 87,000 words by my count), plus shorter stories and our many features—features totally absent from our competitors. In other words, we try to give you as much new fiction as our competitors, plus the classic, plus our special features. The only way to do this is to sacrifice a few pages of illustrations and use small type. —TW

Dear Ted:

AMAZING's short works are, for the most part, overcome by its features. Not that they aren't good; but so often they are over-simple, with points that are merely trite. Anvil's "Trial by Silk," for instance. Though well-written, its premise was used by R.A. Lafferty in one of the chapters of *Space Chantey*, where it was backed up not only by being part of a novel, but also by Lafferty's unique style. This story is a re-telling of Lafferty's story (which I'm sure has been told before—besides of course in *The Odyssey*, which is what Lafferty adapted it from—simply because of the blatant obviousness of its point) in a non-hyperbolic style. (In fairness to Anvil I should point out that he undoubtedly wrote "Trial by Silk" before Lafferty's book was published; his story was purchased originally by Harry Harrison, when he was editor of this magazine, and simply was not published until now. —TW) "Breaking Point" was not a story, but an episode, which, I gather from the last part of the editorial, is as it should be. "I'm Too Big But I Love To Play," now, was a good story; no trite moral to attempt to justify it, good writing, and, although aliens impersonating humans is a familiar sf theme, this was a fresh re-telling. (The point of *Tiptree's* story was not alien impersonation, but an attempt at communication by an alien, which, perforce, required him to become the human he duplicated. —TW)

The novel was quite good. Since in the latter part the focus shifts from Tad's external problems to his internal problems, my quibble becomes less major, since we see the eating-together hang-up as a device to study Tad. Nevertheless: in the first segment of the novel, where it seems that the alien and his actions will be the point of the novel, we are not made to feel any revulsion for eating together, nor are any reasons for the revulsion presented. This is all shown to us, but we *feel* none of it; this, I think, is the major flaw in the novel so far. If the purpose of the novel is to study Tad, as it now seems, than I can *accept* plot devices which apply stress to the main character in order to observe his reactions, seemingly without justification. I can't condone it completely, though, since it seems to be a cop-out on the part of an author who cannot rationalize his social forces. I don't believe you are such an author.

Richard Leach

RFD #2

East Holden, Maine

It is difficult sometimes to communicate the emotional impact of a conditioned response to someone who has not been similarly conditioned. Tad, as a product of his society—where food is wholly "synthesized"—has an extremely strong oral-anal compulsion, wherein eating is, directly linked to defecation, and both acts performed simultaneously. This is perhaps not easily shown in what I consider to be a non-sensationalistic manner, and my approach to writing is not to digress to explain anything which the narrator takes completely for granted. Therefore, the background to Tad's eating compulsions is not made explicit until he himself is forced to question them . . . in the second half of the novel, as it turns out. One point to remember in reading any serialized novel is that it was not written to be fully explicit within any single installment. —TW

Dear Mr. White:

I liked your novel, "By Furies Possessed," in the March AMAZING. My only objection is that the plot is too similar to Heinlein's *Stranger in a Strange Land*. Undoubtedly you'll receive dozens of letters with this very complaint. (But I'm being unfair. I've only read half the novel—probably there'll be a new twist in the next issue.) *(As a matter of fact the only letters to raise this issue were yours and one other—from Judith Hoffman, in Brooklyn Heights—and I hope the second half of the novel has put this misapprehension to rest for both of you. —TW)*

By coincidence, "Breaking oint" has the same title as a totally different story in the February VENTURE by V. N. McIntire. The trouble with "our" story is that Crewman Dyker was obviously inserted just to fit the cover. It would have been a much better story if Dyker had survived to become a member of the group.

As to "sci-fi," I am in favor of it. It's the only abbreviation besides SF, which has sometimes been misinterpreted as "speculative fiction," a term encompassing some of the worst junk the world has seen.

Richard H. Morrissey

55 Claudette Circle

Framingham, Mass., 01701

If "sf" annoys you, I suggest a revival of its antecedent, "stf," which is an abbreviation of "scientifiction" (the term Gernsback coined before he coined "science fiction") and is pronounced "steff". It is an honorable abbreviation and less cumbersome than "sci-fi". —TW

Mr. White,

It seems to be a recurring phenomenon that whenever there is a highly publicized movement of any kind that the proponents of that movement, lulled by said publicity, are convinced that theirs is the wave of the

future, whether they have real support or not. The most recent manifestation of this tendency is the so-called "youth revolution" of recent years which is dying without much extraneous noise.

In science fiction its most recent manifestation is the "new wave" or the "literary revolution" as Justin St. John puts it. It too is dying. Witness the recent death of NEW WORLDS, the growth of ANALOG's circulation from 85,000 to 110,000 whereas F&SF's circulation (advertised as 60,000) is less than half of ANALOG's, and the widespread support of the Second Foundation. *(I must interrupt you to dispute a few of the points you have raised. If the "youth revolution" is dying, I must be one of many who has not yet heard the news . . . but I wonder what "youth revolution" you have in mind—politics, music, drugs, general life-styles like clothing fashions, or what? And while you can prove certain things about various magazines by studying their circulation figures, it should be remembered that these are sometimes less than accurate —although not as far as I know in the two cases to which you referred—and that they do not necessarily prove a thing about the actual quality of the magazines in question. If you check the complete figures, for instance, you will find that ANALOG prints twice the number of copies that F&SF does, and that their sales in terms of percentage does not greatly differ. Other factors also intrude, such as the fact that F&SF, like our magazine, is the product of a small publisher—who in fact publishes only two magazines—while ANALOG is published by one of the country's major magazine publishers. Conde-Nast has a far better bargaining position with distributors, who would probably not accept twice F&SF's present print-run—distributors virtually dictate print-runs to small publishers. Were*

the publishing positions of ANALOG and F&SF reversed, you might well have to face the 'fact' that F&SF sold twice as many copies as ANALOG. In neither case would this 'fact' prove much about the magazines' relative merits. Nor, I must add, does our present circulation provide much of a guide to the present quality of AMAZING or FANTASTIC. —TW)

Justin St. John appears to exemplify this type of person. He doesn't even realize the revolution is floundering.

I fail to see how anyone could argue by routine, even tho St. John seems to think so. Perhaps he meant that Pierce was using logic (such an archaic thing to do; no self-respecting New Wavicle would use such a hackish thing!). The argument he used in his first paragraph is completely inapplicable. I have read Pierce's letter several times, I have also read many other arguments. I have yet to see him repeat his arguments much less make it ritualistic in any respect.

It seems to me that St. John's and Pierce's concepts of the New Wave are different. St. John thinks that John opposes anything new which he has said repeatedly he does not. We merely oppose the attitude of the New Wave and the incompetence in the way they express themselves.

St. John shows his extreme ignorance of the traditionalist ideal and traditionalist writing with his generalisation that traditionalist science fiction is stylized and has a specific formula for fiction. Science fiction is too big, there are too many possibilities inherent in the genre for it to be stylized. St. John seems to think that traditionalistic fiction is the pulp-type of Captain Future, which it definitely is not. He appears to think that science fiction heroes have to be blonde and blue-eyed with square jaws and WASP-like names. If that is so then why did Heinlein, possibly

the best of the traditionalists, in the '50's before it became fashionable to have Negro and "minority group" characters have several? Certainly you cannot say that Waldo was a square-chinned type or even a majority of the heroes of the last twenty years.

There cannot be a hero in a New Wave story by definition. If it does have a hero in it, it would not be New Wave; it would be a traditionalist type story. Justin St. John has got New and Old Wave all mixed up.

Christopher Anvil's "Trial By Silk" presents a rather unique society that might be very practical. Anvil's Interstellar Patrol series that he has written for ANALOG is perhaps his best work. The rest of it ranges from very good to cruddy. Happily this story is one of his better ones even tho its realization is a bit spotty. I do think, however, that if there were such a society it would have the pleasure-seeking part separate and would warn newcomers.

Johnstone's "Breaking Point" was well written but it wasn't even a story; it had no plot and no meat to it.

"I'm Too Big But I Love To Play" is the best story of the issue. It could have been improved by stressing the motives, characteristics, etc., of the alien. (*Why assume he/it had any which would be comprehensible in our terms?* —TW) Also the story has an aura of senselessness around it. James Tiptree, Jr. seems to be becoming a major author behind our backs.

Your own novel, "By Furies Possessed" (I don't see where you got the idea it was a classy title; it sound like a parody of *By Love Possessed* which is a classy title) leaves much to be desired. The characterization is erratic, the society you created is unexciting and uninteresting and the situation lacks realization. It seems you put the idea of eating in company in the same situation as sex in a puritan society. This is pure

balderdash. If it would be in the realm of thing-not-to-be-done it would be more like our society's reaction to excreting in company, i.e., people wouldn't be shocked, they'd think you were nuts.

Matt Hickman
708 20th St.

West Des Moines, Iowa, 50265

But Matt—people would be shocked if you excreted in their company. More important, even in our society many people can't perform such functions in front of other people even when it is necessary—their inhibitions take control. Why assume that present social mores will persist centuries into the future, particularly in light of increased population pressures and their impact upon compulsions toward more rigid privacies? (My editorial in the August FANTASTIC touches on the extent to which overpopulation paranoia is already affecting us. Granted the conditions of Dameron's world, I probably did not extrapolate these pressures and resultant social neuroses far enough—but it does seem to me that those I did suggest are far from "pure balderdash".) —TW

Dear Mr. Berry,

Thank you for the review, however brief, of our fanzine PHANTASMICOM in your March issue. However, there are several things I feel I must correct.

Number one is that I am not the one to send money or contributions to; the contents pages states, "send money to Smith." Here is the proper address to send to: Jeffrey D. Smith, 7205 Barlow Court, Baltimore, Md., 21207.

Next, you say in your review that we have "lots" of amateur fiction. The three stories in the issue cover eleven pages, barely one-sixth of the issue, although a quarter of the contents page. The rest of the issue contains editorials, articles, features, and plenty of

book reviews. The fiction is but one minor facet. Issue #2 should be out some time in January.

Donald G. Keller
1702 Meadow Ct.
Baltimore, Md., 31207

Dear Ted,

The Clubhouse has opened up a complete new world to me because all my previous contacts with sf were through the newsstand.

I don't have my own facilities to print my own fanzine but I would like to try writing for them. Just how do you go about it? Do you just write about anything you want, send it in to a fanzine, and if the editor likes it it's printed? Can you send in book reviews? I don't expect payment but if your article isn't accepted will they return it if you include a self-addressed stamped envelope? Do they give contributors copies or even tell you if your articles are printed?

I realize these questions may seem strange to you but to someone just entering fandom they don't and your magazine is the only place I know of where I can find the answers. Thank you.

Rick Stooker
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And because yours are commonly asked questions, Rick, I'll answer them here. Fanzine fandom is like a big swimming pond full of strange people, all of whom seem to already know each other. The recommended technique for joining them is to dip your toe first, and move in gradually, familiarizing yourself as you go. First, try sending for a few fanzines among those reviewed which strike you favorably. If you like them, subscribe. Read them; they'll give you a good idea what each editor is looking for in the way of contributions. Try writing letters of comment—a good way to

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fortunate, the outcome would be the same as that of the chase. He could hurt the rep, perhaps cripple it—but could not expect to overcome it.

A single bull tricer grazed in the cycads at the edge of an inlet of marsh. Orn saw that in his haste he had trapped himself: ahead and to one side was a bubbling swamp that he dared not enter unprepared, even granted the time to do so, and to the other side was the massive horned herbivore. He had nowhere to go.

Except—

He did it, hearing the struth one length behind. He lunged toward the bull as though to impale himself on the ferocious horns.

The tricer looked up, huge and stupid. A green strand dangled from its beak. Its tiny eyes were obscured by the two vicious horns overshadowing them, and the semicircular flange of head armor stood higher than Orn himself. Yes, a most dangerous creature—but slow to initiate business. Its eyesight was not good, so it judged a potential enemy primarily by size and smell—and did not fear birds. Provided that it recognized them in time.

Orn ran up to it, fluttering his wings and squawking so that his avian affinity was quite clear—to almost any creature. He passed within a wingspan of the tricer's head . . . and the bull merely stood there, attempting to make up its mind.

The struth, however, did not dare try such a stunt. It was a hunter, and therefore not completely dense. Though too small to be a threat to the bull, it was too large to be tolerated by the herd. Orn saw the juvenile tricers sporting near their dams. Actually, few reps guarded their eggs or protected their own young, but those infants who stayed with the herd tended to survive more readily than those who wandered free, so the effect was much the same. No—no

predator was welcome here.

But the struth, intent on the chase, did not sheer off in time. It approached the bull moments after Orn passed: just time enough for the monster to make up his mind. The tricer sniffed, snorted, and whipped his terrible shield about, making ready to charge.

Already the struth realized what was happening. The delay had been in implementation rather than cognizance. Now it halted and pulled back, the bull following. Finally the struth ran back the way it had come, its original mission forgotten. The tricer pursued it a few paces, then stopped and resumed grazing. The episode was over routinely, and Orn was safe.

Just as well. He had had no real quarrel with the struth, and was happy to honor its territorial integrity. His only concern had been to protect himself.

He walked through the herd unmolested. This was good, because it gave him respite, but he could not remain here indefinitely. A tricer cow might absentmindedly step on him. And if anything should happen to alarm the herd, to send it milling or stampeding, he could be crushed between the bruising bodies.

Yet where was he to go? This was a pleasant and memory-familiar valley in type if not in detail, and he could reside here comfortably for some time. But it did not have that something that had increasingly urged him on.

He left the herd and struck for the mountain range that defined the valley. There at least he could find arths and fish to satisfy his returning hunger, and probably that elevation was free of large predators. With this return of the old world had come the old dangers. He had allowed himself to become used to sleeping safely, and until he recovered his proper nocturnal reflexes he

did not dare to sleep amid the reps. Though he could not visualize them until he saw them, he was aware that far more dangerous creatures prowled this valley than the ones he had encountered so far.

This, at least, was the gist of the diffuse array of thoughts Orn had as he climbed the slope.

He returned to the descending river and the volcanic soil, because these were now familiar. Familiarity was life to him. There was danger from the heated earth and the rumbling mountain, but this known hazard militated against *unknown* hazards. The volcanic threat applied to *all* creatures, particularly the reps, and the environment was in fact more hostile to them than to him. He would utilize it until a larger area had been properly scouted.

He encountered no more of the large reps, though his sensitive eyes and nose picked up their profuse traces. There were numbers of them, mostly young, but these hid from him. The valley was not really more crowded than the surrounding areas beyond the badlands; it merely seemed that way because its denizens tended to be larger and more familiar. There were small mams in far greater abundance in the north country, while the huge reps were comparatively sparse. A few crocs, a few snakes. What had happened, there?

He dined on fish again, and splashed the clear water over his feathers, refreshing them. Time had passed, and now it was afternoon. He began to search for an appropriate lodging for the night. He preferred not to roost directly on the ground, but an ascent into a tree was impractical, here where the trees were stunted and scarce. Possibly a good thicket of thorns—

This was a serious matter, and Orn undertook his search carefully. He was looking for a permanent roost—one he

could depend on during the entire period of his stay within this valley. Later he might develop other roosts, so that he could canvass more distant sections of the valley without having to make a long trek back; but this first refuge was essential.

The sun dipped toward the far side, making the range there thrust up in silhouette, and the clouds became pink. But still he had not found a suitable spot.

The ground was becoming warm again, signal of another subterranean furnace ahead, or at least a vent from the depths. It was as though the entire range were riddled with hot conduits. Orn became nervous, reminded again of what could happen in such terrain. He did not think of it at other times; the immediacy, as always, conjured the painful image. Yet he felt there was a certain security in water. Though the river channel might shift, it was protection against actual fire.

Accordingly, he followed an offshoot of the stream up toward its snowy source. He could, if necessary, spend this night in the coldest heights. The reps certainly would not be there. But this would not be comfortable, and it was too far away from the valley proper to be convenient as a regular thing.

He came across a waterfall, as the sun touched the far mountains. The brook passed over an outcropping of hard rock, forming a pool above and another below, and splayed in a shallow falling sheet between the two. The drop was somewhat more than Orn's standing height, but the force of the water was not great.

He recognized the construction. Behind such a sheet of water would be a concavity, where the less durable substrata melted away in the course of millennia. This was the way, in the life-cycle of rivers. Sometimes there was space enough underneath for a large bird to roost.

Orn braced himself and poked his beak into the waterfall. The cold water split, and his head went on through. There was space—but no adequate footing. In an emergency he might grasp one slanting ridge of rock with one foot, and hang on to the carved backwall with his beak, but certainly not by preference. This was not his roost.

Then something activated every perception and conjured a barrage of images, one tumbling over the other in unique confusion. Orn snapped back his head and stood rocking in the spuming water, sorting it out while his wings fluttered spasmodically.

The thing he had been unknowingly searching for—the nameless mission—the object of his quest—

Excitement! For he had seen the traces of a prior occupant of that emergency roost. The scrape of claw, the mark of beak—

The unmistakable spoor of another bird of his species. Another “Orn”—his own age, and female.

Chapter 10: Veg

IT was a truly awesome range: scarred volcanic cones set almost adjacent to each other to form a wall, seemingly solid, extending right into the sea. The ambient fumes suggested that the volcanic activity continued beneath the water, too, and there were very few fish.

“I don’t understand this,” Cal lamented. “This should be about where Baja California terminates, or will terminate, on our globe. This formation, to put it euphemistically, is atypical.”

Veg maneuvered the Nacre into deep water, unconcerned with that aspect. He

could see why the mantas hadn’t fooled with this section; it was a real wasteland.

The mountains were followed by much more active cones. An almost impenetrable fog of gas and floating ash obscured portions of the shore. After that came desert, rent by jagged rifts. They drew the raft in only enough to view the desolation under strange foul clouds, and did not touch land.

At one point the wind reversed, pushing the Nacre far out to sea before he could angle it back. The smell was appalling. They had to tie shirts over their heads to keep the stinging particles out of eyes and lungs. The four mantas huddled inside the cabin, no more comfortable though of course they did not need to breathe.

After days and nights of this another range appeared, even more massive and imposing than the first. Its oceanic barriers extended far out, becoming mighty reefs with jigsaw-puzzle elevations poking through the surface. It was as though grotesque statues stood upon the water, mocking Jesus Christ.

Twice the Nacre was snagged, forcing them to disembark and struggle waist-deep in the gritty fluid to free it. But there were some few fish here, and corals, and crabs, and barnacles. They had to wear shoes in the water, to his dismay, for the fish had teeth, the crabs pincers, and the coral was sharp.

“But where there’s life, there’s hope,” Aquilon said. He didn’t think it was funny, but agreed that some sea-life was better than none, for things must be about to ease up.

At last they spied deep water—but had virtually to portage across a final band of shallows. The solid raft, even without their weight or that of the mantas, projected too far down to make navigation easy, and it was crushingly heavy to haul about by

hand. The palm wood had become waterlogged, making it worse. He had to dive under and remove the keel, and even so the raft caught on every conceivable piece of reef. Veg braced his feet against the rocklike coral foundation and hauled on the front rope, while Cal and Aquilon pried with poles.

Busy as he was, he couldn't help noticing Aquilon's anatomy as she strained at the raft. Her shapely legs were bare from the water level up to her brief shorts, and her midriff was open too. Her bosom flexed as her arms moved, each breast a live thing straining at the halter. Her blonde hair was tied back, but several major strands had pulled away and now whipped across her face erratically.

Ah, she was lovely now—far more so than when she had affected nudity that one time just after they landed. Clothes made the woman, not the man, for they supported and concealed and enhanced and made mysteries where mysteries belonged. Not that she was unattractive, nude; oh no! But now—now he felt like charging through the water, sweeping her up entire, and—

And nothing. With Aquilon it had to be voluntary—even in his fancy. The mere touch of her fingers on his arm meant more than the definitive embrace of any woman he had known before. Her smile gave him a shortness of breath, though he had loved her long before he had seen her smile. Even that time on planet Nacre, when she had made that shocking expression, as though the muscles of her face were connected up the wrong way—even then, his horror had been because he *cared*. In fact, it hardly seemed that there could have been a time when—

The raft broke away from whatever submarine object had held it, and Veg tumbled forward into deep water. He let go the rope and clamped his mouth and eyes

shut as he hit. The warm bath tugged at his clothing, and trapped air hauled him immediately back to the surface before bursting out of his shirt in an embarrassing bubble.

For an instant his eyes opened under water. It was clear, here.

A giant fish was coming at him. It resembled a swordfish, but it had a fin on its back like that of a shark and its eyes were each as big as a human head. The creature was well over twenty feet long, sleek, swift and strong.

Veg propelled himself out of the depths and onto the reef in a manner he could never afterward recall. He stood at the brink, dumbly pointing.

The fish broke surface and leaped partially into the air, its tremendous nose-spine opening to reveal many small teeth. Vapor spouted from a blow-hole over the eyes.

"That's no porpoise!" Aquilon exclaimed, amazed.

Cal stood openmouthed. Veg had never seen the little man so surprised.

The creature departed as rapidly as it had come, never bothering to attack. Veg's knees felt weak. That dinnerplate eye! "Never saw a fish like that before," he said shakily.

"Fish?" Cal was coming out of his daze.

"Didn't you see it? With the beak and the—"

"That was *Ichthyosaurus*!" Cal said, as though it were marvelously significant.

Now Aquilon began to react. "The reptile?"

"The reptile."

Veg decided there was something he was missing, but he waited until the Nacre had been reloaded and they were on their way again before challenging it.

The treacherous reefs enclosed a moderately shallow ocean basin about thirty

miles across. Into this projected two large islands separated from each other by a one-mile channel. They were mountainous; ugly black cones rammed into the sky from each, and yellow-brown vapor trailed from one.

"Scylla and Charybdis," Aquilon murmured. "Let's go around."

Veg obligingly angled north so as to pass Scylla on the western shore, heading in toward land. His keel, replaced, was not properly firm, but the weather in this cove was gentle and he had no trouble. About three miles separated the island from land, and on both sides were small white beaches backed by tangled jungle. Nearest to the water were tall tree-ferns, but inland, up the mountain slopes, he could make out the solid green of stands of pine and fir. There was a light haze, and every so often he sneezed.

"Heavy pollen in the air," Cal explained.

"Now that we're on the subject," Veg said, "what's wrong with that fish being a reptile?"

Aquilon looked at Cal. "He just won that bet about the dinosaurs, and he doesn't know it!"

"I did?" Veg asked. "All I saw was a big-eyed fish, dark-gray with a light-gray belly and a snout that almost rammed me. And you—"

Cal looked serious. "Nevertheless, its presence forces us into a considerable reappraisal."

"Funniest looking dino I ever saw! How long did you say they've been dead?"

Aquilon reached up to ruffle his matted hair. She, at least, was at ease. "Extinct is the word, not dead. And it's been about seventy million years, on Earth. The dinosaurs died out at the end of the Cretaceous."

"So they've been gone five million years, here—and we haven't seen one yet, and maybe we won't unless we go back into the

Bodacious."

"Cretaceous," Cal said, taking him seriously. That was another sign that the man had been badly shaken up. "The name comes from the Latin word *Creta*, meaning chalk. So it's the chalk age. Chalky limestones such as the White Cliffs of Dover—"

"So the dinosaurs were full of chalk," Veg said, wondering how far to take this game. "Used it in their big bones, I guess."

"I'm afraid that's not quite it. The chalk came from the compacted skeletons of billions of single-celled animals, the Foraminifera, who lived in the shallow seas. But such animal chalk deposits are hardly more than an episode in the seventy million year period of the Cretaceous."

Veg remained solemn. "On Earth, maybe. But this isn't Earth."

"But it is," Aquilon murmured. "Paleocene Earth. Dawn of the age of mammals."

"I *know* what mammals are," he said, looking at her bosom.

"Mammaries," she said, correcting him without embarrassment. "Typical of the mammals."

"Whose distinguishing trait is—hair," Cal added, suppressing a smile.

Veg let that pass, seeing that Cal had gotten over his disturbance. "So if there are dinosaurs, this would be Creta instead of Paleo. Now how about this famous fish?"

"Cal just explained," Aquilon said. "It's not a fish. It's Ichthyosaurus—a swimming reptile. Its ancestors walked on land, and it breathes air."

"Same as a crocodile. What does that prove?"

Cal took over. "Ichthyosaurus is a member of Class Reptilia, order Ichthyosauria—the swimming reptiles. It is not considered to be a dinosaur. The dinosaurs are actually a popular composite

of two reptilian orders, the Saurischia and the Ornithischia, respectively 'lizard-hips' and 'bird-hips.' They were primarily land or swamp dwellers."

"Somewhere in there I think you brushed near my question. Icky is not a dinosaur, just as I thought. Good. So now tell me why you figure it's so significant, this fish-reptile. What's it got to do with dinosaurs?"

"He's got you there," Aquilon said to Cal.

"They were contemporaneous phenomena. The Cretaceous was the zenith of the reptilian radiation. Almost all the lines flourished then—and almost all died out before the Paleocene. The ichthyosaurs passed before a number of the land-dwelling forms, so—"

"So if Icky's still here, so are the dinos," Veg said. "Now I make the connection. It is like a dinosaur poking his snout over the hill."

"Of course that doesn't necessarily follow—"

"Oh, no, I'm happy to have it follow. Serves you right."

"But you see, this is the Paleocene," Cal said. "The ocean fauna, and everything we have observed on land—the evolution of the other species is cumulatively definitive. Dinosaurs have no place here, no place at all, unless—"

"Unless?" Veg and Aquilon were both curious.

"Unless there is an enclave. An isolated carryover of the Cretaceous fauna—doomed to extinction, but surviving the demise of its age by a few million years. Those sea reptiles that fed on fish or belemnites might endure, such as the particular ichthyosaur we encountered, but not those specializing in ammonites. Though why there should be no fossil record—"

"It *could* have happened on Earth," Aquilon said. "We might yet discover a

submerged bed of fossils that proved—"

"Down!" Veg whispered ferociously.

They obeyed immediately, cutting off the conversation. In silence they followed his gaze.

They had been rounding the green bend of the island Scylla, Veg now poling the craft along. Standing, he had the best view, and so had seen it first—but it made them all flinch. In the silence one of the mantas poked around the shady side of the cabin: Hex, getting his own eyeful.

It was a tremendous serpentine neck, seeming at first to be truncated just short of the head. The column projected fifteen feet from the water, and was barely a hundred feet from the raft. It was smooth and round and gently tapering—and as he examined it more closely, he found that it terminated in a head hardly larger than the neck's smallest diameter. An eye was half hidden under a kind of fleshy crest, and beyond that was a rounded, wrinkled snout. Despite the small appearance of the head, he judged that the jaw was a good two feet long. That creature could, Veg reflected, finish a man in just about three bites lengthwise.

Plumes of vapor formed above the crest, signifying the location of nostrils, and now Veg could hear its heavy-bellows breathing. There had to be a lot more body out of sight beneath the water, for he could make out no expansion and contraction of the visible portion as the air rushed in and out.

As they watched, the minuscule head dipped in toward the land, to take a swipe at floating foliage there. The teeth were pegs that clamped rather than cut or chewed. The creature either hadn't noticed them, or it considered them to be beneath notice.

Veg poled the Nacre quietly backward. Slowly they rounded the turn of Scylla, passing out of sight of the monster as it lifted its head high to swallow.

"That is the biggest snake I ever heard

of," Veg announced when they had achieved the limited safety of distance.

"No snake could lift its head like that, that far," Aquilon said, obviously shaken. "Not unless it were over two hundred feet long—and that's unlikely. I think that's some other swimming reptile. There was one with a long neck, wasn't there, Cal?"

Cal smiled with some obscure satisfaction. "Yes there was, 'Quilon. Some types of Plesiosaurus. But such a creature could hardly stand still in the water like that, and would not feed on watercress. This is a reptile of quite a different nature—a true dinosaur, in fact. We saw only a tiny portion of it."

Aquilon stood up straight. "Of course! The thunder lizard—Brontosaurus!"

"No. Not quite. The head does not conform. The brontosaurus's nostrils were at the apex, and I doubt that many survived much beyond the Jurassic. This would be its later cousin, the largest of them all: Brachiosaurus."

"Brach," Veg said, pinning down the name. "Sounds like some fantasy hero."

"Brachiosaurus—meaning 'arm-leg,' because its arms are longer than its legs, in a manner of speaking," Cal said. "Brontosaurus was the other way around, its hips being higher than its shoulders."

"I always thought Bronto was the largest dinosaur," Aquilon said.

"Bronto weighed as much as thirty-five tons. Brach may have gone up to fifty tons."

"Oh."

"Quite innocuous, except through accident. The sauropods are herbivorous, and would not become violent unless hard-pressed. But their size—"

"Vegetarians," Veg said. "Good guys. Let's get acquainted, then."

"With fifty tons of nearly mindless reptile?" But Aquilon shrugged. She, like Veg, seemed to have become inured to a

certain extent to personal danger—and Paleo, so far, was as safe as Nacre had been.

They advanced again, cautiously. The head and neck remained, feeding as before, resembling a crane as it hoisted up and down, with visible bulges from the down-traveling boluses of greenery.

"Harmless, you said," Veg murmured, losing his bravado as he was forcefully reminded of the scope of this creature.

"Bear in mind that the sauropods are not very bright, as 'Quilon mentioned," Cal said. "And as you mentioned, big vegetarians—"

"Are good guys—but sometimes squish nasty little carnivores—by accident," Veg said, smiling.

"The carnivores were not necessarily small, in the age of reptiles. But as I was explaining, this creature may run eighty feet in total length, and it takes time for the neural impulses to travel along its—"

"Yeah, I know about that." They were whispering now, subdued by the presence of the giant. "So if Brach thinks we're food, some kind of new turnip maybe, and wants to take a bite, it'll still be a while before he gets around to doing something about it."

Aquilon was now busily painting the portrait of the fleshy column. "By the same token, if it changes its mind and decides *not* to take a bite, we may be halfway down its gullet before it desists."

Cal smiled. "Actually, it could probably desist from *biting* quickly enough, since its brain is adjacent to its eyes and jaws. But larger motions—"

They were now quite close to the feeding head, lulled by its pacifistic and plodding manner. Down—bite—up—swallow—and repeat. Veg glanced into the cabin to see how the mantas were taking it, and discovered that only two remained. The others had evidently left during the excitement, perhaps taking advantage of the

temporary overcast that now existed. But he couldn't spare the time to investigate; Brach was too important.

Closer yet, and an impressive view. The skin of the neck, rather than being smooth, was covered with wartlike tubercles, and on the head wrinkles overlay creases on bulges, the topology changing with every slow shift of the jaw. The mouth swept up leaves, stems, water and mud from the bank, straining some of it back out in the haphazard process of mastication. Brach was either very old or very ugly. But the muddy water still concealed the rest of the reptile's body.

"I heard once that if a dinosaur were walking along," Aquilon remarked, "and discovered that it was about to step over a cliff, by the time it could make its legs halt it would have gone over. So its very size led to its extinction."

"Like much hearsay, not true," Cal said. "I suppose that if a creature the size of Brachiosaurus were proceeding on land at a full gallop, its mass would carry it over the cliff in such a situation. Fifty tons do not stop on a dollar. But Brach would never find himself in such a predicament."

"Why not?" Veg asked, though he was hardly interested. This dialogue was merely a way of rationalizing the incredible and postponing healthy fear. They were talking too much. Yet the monster went on feeding.

"Because Brach would not be found innocently trotting along like that. Full-grown, he's far too heavy to walk on land with any comfort. He must stick to water, or at least swamp, so that his body is buoyed up."

"So I see," Aquilon said.

"Brach, much more than Bront, is adapted for deeper water," Cal continued. "Note the placement of the nostrils and the angle of the head. But his range is sharply limited to the coastal shallows. His presence

here, rather than Bront's, is an indication that the flat swamps are less extensive than they were. And of course we've seen that directly. Evolution is never random."

"Perhaps we should get moving again, if we're going to," Aquilon said gently.

"But all we've seen is his head!" Veg protested facetiously. Fifty tons was too large, even if all he could actually see was two or three tons; it alarmed him.

"That's all anyone usually observes," Cal said. "Assuming that anyone before us has had the opportunity. Better be satisfied."

Veg was willing to be convinced. He poled the craft into deeper water, and he and Aquilon took up the paddles. They passed about forty feet behind the busy head. He judged that Brach was standing in about twenty feet of water—and that implied much about its size.

His paddle struck something. "Obstruction!" he said. "Log, maybe, under the surface. Sheer off before we—"

Too late. The raft collided with the object, jarring them all. Veg felt the rending of the keel as it tore off. There would have to be substantial repairs.

"Reef?" Aquilon inquired, brushing back hair that had fallen across her face.

Veg probed with the pole. "Water's deep here. I can't find bottom." He angled the pole forward, searching for the obstruction.

Cal had been shaken harder by the bump, partly because he was less robust physically, and partly because he had not been anchored by a paddle. He must also, Veg thought, have been preoccupied. Veg himself was able to accept something like a dinosaur on Paleo, but the concept evidently came harder to Cal. The little man was sitting very still now, recovering his wind while the others assessed the situation.

"Move out—fast!" Cal snapped.

Again they responded to the need of the

most urgent member. First it had been Veg, spotting Brach; now it was Cal, not as winded as it had appeared. They had worked together long enough on Nacre, and now on Paleo, to know almost intuitively when life depended on instant cooperation.

As the raft began to move, thanks to the strenuous efforts with the paddles, Cal explained: "That was no log or reef. That was the tail."

Aquilon looked at the troubled water behind. "The tail—of the dinosaur?"

But again events provided confirmation. From the water came the tip of a massive fleshy extremity, stirring up waves.

Veg peered across at the head. "It's still feeding. This can't be the same—"

Then the head stopped chewing and sifting. It lifted and rotated to face them, while the tail struck the water furiously.

"... that slow reaction time," Aquilon murmured.

"Keep moving," Cal said urgently. "It's aware of us now, and that blow to the tail must have hurt. If it decides we're an enemy—"

"Harmless, you said," Veg repeated, with some irony.

"Oh, I'm fairly certain it won't attack. Its natural inclination would be to flee from danger. But—"

"We *did* bruise its tail," Aquilon said.

They could all see it now, as the tail lifted clear of the waves again. Diluted blood streamed off it. Their keel had cut a gash in the spongy flesh—not a serious injury to an animal of that size, but enough to color the surrounding water.

"Smarts, I'll bet," Veg agreed with some sympathy. A wound of that magnitude in a lesser creature would have been fatal. It was several feet long and inches deep.

Then the water churned in earnest. Brach had made its decision.

"Move!" Cal cried. "He's running!"

The two mantas remaining in the cabin popped out, though there was still direct sunlight. They sailed over the surface. Veg knew they couldn't keep it up long; the sun would burn them terribly and injure their eyes.

But the dinosaur was coming *toward* the Nacre! The tiny yet ponderous head looped about, gliding low over the water, and the neck threw up a white wake. The tail retreated, its tip skipping over the waves smartly. Between the two—a distance of about fifty feet—something like a whirlpool formed, and from it several tiny indentations spun off.

"Divert the head!" Cal called. "Don't attack! Herd it!" He was addressing the two mantas, who now circled the raft uncertainly. "Bluff it! Move it aside!"

Hex and Circe (Veg was sure he recognized them) seemed to understand. In turn they swooped at the head, banking with kitelike flares of their bodies. The head reacted fairly quickly, flinching away from them, but still approaching the raft. As Cal had explained, it took time to change the course of such a mountain.

Brachiosaurus came at the trio—but the head missed by twenty feet, the eyes not even focusing on them. Water surged aside, rocking the raft as though a huge mass trailed that wormlike forepart. In a momentary eddy they saw the speckled flank, and the muscular rhythm of it.

The body missed them by only ten feet, and that because the raft moved with the current of water thrust aside.

Then the main torso was beyond, and they balanced precariously on the swell, relieved. In that unguarded moment the tail struck. It was not the cutting whip of the manta, but its blind ponderosity was fully as devastating.

The tail rose from the water under the rear edge of the Nacre and flipped it over.

Aquilon dived away sidewise, hitting the water before the raft toppled. Veg hooked his right arm around Cal's midsection, lifted him as the Nacre came up, and shoved off to the left. The raft bobbed endwise, sinking into the water; then it rebounded and seemed to fling itself over. Veg kicked his feet, keeping his arms wrapped around Cal, driving away from the splash.

The waves subsided. The dinosaur was gone, the raft inverted but steady, and already the two mantas perched on it. Aquilon waved, showing that she was all right. And, blessedly, a cloud dimmed the sun, giving the mantas relief.

Veg lifted up Cal, hoping the man had not taken in much water, but his concern was needless. Cal blew out the breath he had held during the upset, smiling. Veg kept forgetting that his friend had recovered considerably since Nacre. Cal remained small and light, but by no means infirm.

Veg let go, and together they swam back to the raft. Aquilon joined them there. They peered at one another over the shattered keel, and at the two mantas.

"Does this seem familiar to you?" Aquilon inquired with simulated brightness. Her hair was dark and lank, now that it was wet, and her eyes more gray than blue.

He knew what she meant. Back on Nacre, at once like yesterday and a decade past, they had begun the adventure that was to meld them into the trio. Beginning at the corpse of a tractor, and knowing that their journey back to the human camp would be a terrible one. Blood had been shared, literally.

He clung to the edge of the raft and looked about at the debris. A can of kerosene floated nearby, but there was no sign of the lantern it serviced. Beyond it was a wicker basket, empty of the food it had carried. Aquilon had found ways to occupy her nimble fingers during the long

southward voyage, fashioning things from natural materials; it hurt him to see her handiwork adrift. Most of their equipment remained lashed to the raft, for the bindings were tight. It would be a tedious job getting it loose safely, but could be done.

Their radio set, so carefully conserved if never used, had ripped away from its mooring, and now surely lay at the bottom of the channel. Their theoretical contact with civilization was gone.

Yes, it was like old times—and he wasn't sorry. They could stay lost forever here, and he'd be satisfied. A friend like Cal, a woman like Aquilon . . . and of course the mantas.

At least the paddles remained. One was broken, but could be mended or replaced: palm fronds were plentiful. The stout bamboo pole was undamaged.

It would be pointless to try to right the raft here. They would have to haul it onto land, then see what they could salvage. Most of their supplies could survive such a dunking.

Hex and Circe took off and pounded over the water. At once they circled back. "Oh-oh," Veg said. "Trouble?" •

Two snaps, almost in unison: each manta agreeing. They seldom spoke at once like this.

"Predators!" Cal cried. "I should have thought! The wound—"

He meant the blood that still discolored the water around them. Veg knew that Cal still did not like to say that word—blood. Of course the flavor would attract the vicious creatures of the sea. Brach must have bled gallons, kegs, barrels . . .

"Sharks!" Aquilon exclaimed.

And then the three human beings were out of the water and aboard the inverted raft. Veg was sure that neither of the others was aware of scrambling up, any more than he was. When one thought of sharks or

crocodiles while swimming, one left the wave in a hurry, that was all.

It was no mistake. There were sharks, invulnerable to the lash of the mantas' tails because they swam below the surface. Veg splashed with the good paddle—how had he brought that up with him?—and they retreated, but not far.

Cal's face was pinched. "The sharks won't come up after us," he said. "But the reptiles—if *Kronosaurus* ranges these waters—"

"Who?" Aquilon had the broken paddle, and was fishing with it for the floating pole. Veg let her fish; if he moved over to her side, the raft would tilt, and stability was suddenly very important.

"*Kronosaurus*—a short necked plesiosaur. Fifty feet long, jaws twelve feet long, the size of a small whale—"

"I get the message," Veg interrupted. Prodded by this vision, he thought to pry his own paddle against his side of the raft, pushing forcefully outward so that the Nacre nudged toward the pole Aquilon wanted. She hooked it in, then went after the kerosene.

They conferred hurriedly and decided on the obvious: landfall at the nearest point. That way the Nacre's beachhead could mark the spot where the lost radio lay, on the ocean floor. Assuming recovery of it would do any good at this stage, since it hadn't been sealed against such total and prolonged immersion. He and Aquilon started paddling.

"Harmless, you said," Veg muttered, his spirits rising as they passed out of the pink water, spotting nothing but frustrated sharks. "Would run from danger, you said." But he smiled.

"It *did* run, if you mean Brach," Cal replied. "But it ran to deeper water. Most of its enemies are land dwellers."

And they had been between the dinosaur

and deeper water, and Brach was not very bright. It figured.

He still had not seen the creature. Only its head and tail, and a portion of its shoulder.

The sharks, apparently satisfied that no percentage remained in following the raft, disappeared. But no one offered to swim.

Laboriously they brought the raft to poling depth, and then shoved the ungainly monster up against the shore.

Fern trees leaned over the water, giant cousins of the plants Veg once had picked by hand near his cutting acreage on Earth. A strange conifer rose above them, its needles bunched peculiarly. He saw no grass, no flowers. Half-floating water plants massed at the tideline.

"Cretaceous landscape," Cal murmured. "Astonishing." But he sounded awed rather than surprised.

There were, fortunately, no shore-dwelling predators in sight. Calf-deep in muck, Veg and Aquilon hefted the loaded raft up. But it was far too heavy to be righted this way. They would have to hold it while Cal braced it with sticks; in this marshy terrain there were no rocks to set under it, and no really solid footing. But first they had to slide it up beyond the level of high tide, so that it would not be carried away in the night. "Quilon, you steady it while I heave," he said.

They tried, but the Nacre lifted only inches while his feet skidded away in brown slime. "No use," he grunted. "We'll just have to take it apart and rebuild it right side up. Might as well make camp."

He was not unhappy at the prospect. Sailing, he decided, was not his forte; hiking and camping were better. It reminded him of their other hike together, on planet Nacre. Something had begun then between him and Aquilon. Something intriguing. More and more, his mind was coming to

dwelt on that.

His gaze met hers, over the raft. She realized it too. Their return to Earth had cut off what had been developing; she had wanted it that way for some reason. But now—now there could be a middling and an ending to that beginning.

No, he did not mind being stranded for a few days or weeks or longer. He did not mind danger or hardship. To be here in the ancient forestland with Aquilon, here for the second session . . .

"Probably Brach wouldn't have been feeding here if it weren't fairly safe," Cal remarked. "A large land carnivore might bite off Brach's head, and that would be, eventually, fatal. Reptiles die very slowly. So while I couldn't call our encounter with the monster exactly fortunate, it does have its redeeming aspect. We can't tell what we might have met, farther in."

"Still, let's not try to camp right here," Aquilon said, looking down distastefully at the bubbling goo covering her feet. "Sleeping in a flooding cabin was bad enough, but this—"

There was something hilarious about it, and Veg laughed. Aquilon tried to glare at him, but looked at her mired ankles again and joined in.

Yes, it was good to be back. Earth was like a pressure cooker with the temperature rising and the escape valve blocked. They were better off here.

The two remaining mantas, Diam and Star, had rejoined them at some point, perhaps while he was preoccupied with the problem of landing the raft. Veg was sure they agreed. They hadn't been scouting this territory just for the fun of it.

Night found them camped under a large tree whose stout branches and small twigs gave it the aspect of a stiff-armed octopus. Each twig had a cleft, fan-shaped leaf,

unlike the branching-veined greenery of conventional trees. This was a Ginkgo, and Cal seemed to feel it was something special, though he claimed they existed on contemporary Earth.

They were in a lean-to improvised from cycad barrels, palm fronds and fern-leaf, on a rise overlooking the beachhead. Cal had designed it, showing more practical ability than Veg had expected. Veg had done the brutework, collecting the peculiar wood. Aquilon had plaited fibers to make the roof tight. Yes, they were a functioning team, a good one.

The finishing was a more tedious task than the designing or building, and Veg had time to loosen the nylon bindings of the Nacre, get the logs enough apart to free the supplies within the crushed cabin, and begin ferrying supplies to the camp. Cal and Aquilon remained crosslegged by the lean-to, weaving fern-stems in and out.

Veg kept a sharp lookout for life, hostile or otherwise, though Hex was with him and made an effective bodyguard. He did not know much about dinosaurs except that they were big and dangerous—even the herbivorous ones, as the wrecked raft testified. Brach would not be wandering on land, however, if what Cal said was true—and of course it was. But other creatures might be found anywhere. Brach would not have been so ready to flee to deep water unless there were things on land it feared.

A creature that could frighten a fifty ton dinosaur could hardly be ignored by a tenth-ton man.

Unfamiliar birds twittered in the fern-trees, scouting for bugs. Small things scuttled in the brush. Fish swam in the water. There was plenty of life, but nothing to fear, yet.

He lifted the last of the cases they had decided to move, brought it to his shoulder,

and tromped through the sludge. Yes, they all had to be alert here, on guard against unknown menaces. But the air was wet and warm. The biting insects had not yet discovered him, and he felt marvelously free. Perhaps he would die tomorrow in the jaws of some monster whose name he could not pronounce—but he would die a man, not a sardine.

Hex ranged ahead as they came out of the swamp and recovered firm footing. It was dusk, growing too dim for him to see clearly, but he liked the challenge. The manta drifted to one side and stopped beside a tree—a maidenhair, Aquilon called it, but it looked exactly like the ginkgo—and stood as a black blob. By tricks of vision—looking slantwise at specific objects, narrowing his eyes—Veg could still make out good detail.

What was Hex looking at?

He came up and peered. Was that a—?

It was.

Veg squatted down beside the manta, holding up the teetering carton with one hand while he cleared away obscuring foliage with the other.

It was the print, in hardening mud, of either a bipedal dinosaur or a very large bird. Three sturdy claw-marks, the points digging down and forward, no rear toe showing. Whether toothed or beaked, a land-walker armed with effective talons that could gut a man in a hurry.

The creature was somewhere within range of their camp. Veg was glad the mantas would be mounting guard this night.

—Piers Anthony

—To Be Concluded—

(CONTINUED FROM PAGE 127)

break the ice and introduce yourself (if I may scramble my earlier metaphor). From there on, the speed with which you move is strictly up to you. A used mimeo or spirit duplicator can be had cheaply enough, if you decide later to publish a fanzine of your own, but certainly you shouldn't consider that step until you know your way around better. Each fanzine has its own slant, and the question of what to write is best answered, as I said, by reading an issue or two. You'll then know whether, for instance, book reviews are a likely contribution. (In many cases they are.) If the fanzine editor likes your contribution he'll let you know; the stamped, self-addressed return envelope is a good idea, for reasons of simple courtesy, but professional practices are generally less formally adhered to. The almost inflexible rule with fanzines is that contributions are "paid" for with a complimentary copy of the issues in which they appear—and if you're a subscriber,

your sub is extended. Some fanzines extend this courtesy to published letters, or indeed any letters of comment received, published or not. Few fan editors keep complicated books these days, and often once you're on a mailing list for a fanzine you will stay on it as long as you acknowledge it every so often. Fanzine editors publish for "egoboo"—for the pleasure of their readers' response. Fanzine contributors write for fanzines for the same reasons: to see their words in print and receive (in the next issue's letter column) a response. Fanzines are a very rewarding hobby in this sense, and some pros in the sf field have invaded fandom in recent years simply because it gives them the give-and-take feedback they feel they do not get from the professional publication of their stories and books. (And one of the things I've tried to do with AMAZING and FANTASTIC is to restore this feedback to the professional arena as well.) —Ted White

(CONTINUED FROM PAGE 105)

ics of the late Palaeolithic period from excavations at Stagshaw, reported an amazing discovery yesterday to the home office.

"While uncovering stone weapons of the period, the diggers struck a peculiar metal framework, spherical in shape and near it what appeared to be a chrome-steel automatic. John Wayne, president of the foundation, was flying

to Stagshaw late today and could not be reached for a statement. What is most distressing to the members of the expedition is the fact that use of metal had not been discovered by inhabitants of the late Palaeolithic Period, and the presence of twentieth century chrome-steel embedded in fossilized rock of fifty thousand years ago is causing a great amount of speculation."

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still have clippings sent to me by friends all over the country about civic comic-book burnings, in which whole communities, in a sort of mass expiation, donated their comics to great bonfires. A senate committee was set up to look into the comics of that period, and there was a great deal of talk of banning them all together. The end result was the present-day Comics Code Authority, which, in a couple of years' time, managed through harrassment to reduce the number of publishers of comic books from some forty or fifty to less than a dozen. The Code was primarily funded, needless to say, by the principle survivors.

Dr. Wertham was not happy with the Code; it was less than a total victory over the evils of comic books. But he apparently subsided. His book had been a best-seller, and it is possible this provided some satisfaction for him. I lost track of him for the rest of that decade.

He popped up again the late fifties or early sixties, with a set of parallel attacks on television, this time in *TV GUIDE*. Again, his message seemed simplistic in the extreme. But this time he found it harder to stir up the populace. Nobody cared about comic books (nobody but kids)—but everyone watched tv. And the silent majority wants exactly the sort of mindless pap to which Dr. Wertham (with some justice) objected. Again, fade-out.

Well, the years have passed, and the old comics of yesteryear, so thoughtlessly thrown onto the bonfire of public self-satisfaction have now become valuable collector's items, bringing outrageous and ridiculous prices to those still fortunate enough to possess copies.

Now Dr. Wertham is investigating science fiction fandom.

I am indebted to the newszine, *LOCUS*,* for supplying me with the basic facts, which are these:

*"In the past couple months, we've received a number of letters and notes from fans mentioning that Dr. Frederic Wertham has been subscribing to fanzines and even writing letters of comment. ...I've generally ignored these notes, not deeming them of sufficient general interest. There have been a number of papers and studies about fandom and fanzines in the past and none of them made any splash whatever. ...Anyway, from the letters I've seen in various fanzines, Wertham seems genuinely interested in fandom. He even subscribes to *LOCUS*.*

An article in the December issue of The Twentieth Century Fund Newsletter has given me some second thoughts. Here is the article printed in toto: 'Fanzines—amateur publications produced by adolescents that discuss comic strips, science fiction, sex, and the adult world—will be the subject for a Fund study under the direction of Frederic Wertham, a well-known psychiatrist. Dr. Wertham, who has been collecting these publications and studying this almost unknown sector of the underground press for many years hopes to produce a monograph that promises to be the first report on fanzines for either the academic or the general reader and is part of the Fund's continuing interest in both professional and amateur media. The study will examine the content of fanzines, describe their production, and attempt to draw conclusions from what they reveal about an important segment of the country's adolescent population. The result of the study, Dr. Wertham believes, can have a bearing on adolescent psychology, education, student unrest, sexual mores of youth, freedom of expression, obscenity,

**LOCUS is published biweekly by Charlie Brown (2078 Anthony Ave., Bronx, N.Y., 10457) at 5/\$1.00; abridged quote copyright 1970 by Charles N. Brown.*

violence, political attitudes of youth, juvenile drug addiction, and the economics of amateur publishing.'

"I don't know very much about comic fandom, but the picture of sf fandom is certainly distorted. Most of the leading fanzines (this one included) are produced by people over thirty; not by adolescents discussing the adult world—"whatever that means."

—Charlie Brown

Frankly, I'm appalled at the notion that a man as notoriously given to superficial studies and pre-conceived notions of what he will find as Dr. Wertham should be funded to research into our social pastimes.

Because that is expressly what sf fandom is: a pastime and hobby for people who are enthusiasts about science fiction. Fanzines—as our own *Club House* makes obvious—are the paper tip of this social iceberg. They are a means of social intercourse and self-expression for geographically removed fans.

Dr. Wertham's "Monograph" will not be "the first report on fanzines for either the academic or general reader," of course. Fanzines have been general knowledge to the science fiction magazine reader for more than thirty years now. And although most sf readers never chose to involve themselves in fandom, I should be surprised if most of them aren't semi-conscious of it. Allusions to fandom have not only been a part of the editorial contents of a great many of the magazines in our field for decades, they have also been incorporated directly into such stories as "A Way of Life" by Robert Bloch. Science fiction conventions have formed the background for several sf stories as well. And *LIFE* magazine, in its famous early-fifties survey of our field, at least passingly commented upon fandom and fanzines.

The usual tone of an outsider commenting on the twin phenomena of

fandom and fanzines has been patronizing, if not one of outright contempt. Ever since *TIME* reported on the first World SF Convention in 1939 as if it had been a gathering of would-be fraternity pranksters, it has been popular with the media to treat us all as none-too-bright descendants of Flash Gordon, Superman, and Buck Rogers—little realizing that in all three cases the descent was in the opposite direction. "You mean you read that crazy Buck Rogers stuff?" was a refrain most of us had to put up with back in the days when sf had not yet been blessed with respectability by the literary critics (most of whom still do not recognize our existence except in the form of bad Japanese monster movies... *sigh*).

I very much doubt that an outsider like Wertham, coming upon us as he has with any number of fixed preconceptions about the Phenomenon he is investigating, will even be able to sort out the tangled antecedents of present-day fandom and fanzines. There are, you see, a proliferation of fandoms today, most of them bastard offsprings of sf fandom, and of varying degrees of consanguinity.

Science fiction fandom is forty years old this year. In point of fact, we plan to celebrate it in a small way in our next issue. Two books have been published—Sam Moskowitz's *The Immortal Storm*, in 1954, and Harry Warner, Jr.'s *All Our Yesterdays* in 1969—which more than adequately cover the historical origins of fandom, the type of people involved, and the nature of their activities.

The point where researchers most often lose sight of the threads is somewhere in the early 1950's. At this point comics fandom first gained self-awareness—and precisely as a result of the comic book line most critics including Dr. Wertham singled out for the greatest condemnation: the EC comics.

What happened is that several comics fans *who were also sf fans*, transplanted the idiom and practices of sf fanzines and fandom bodily into virgin territory. The first two were James Taurasi, Sr., who was at that time publishing FANTASY TIMES, a newsletter fanzine, and who spun off for a brief time FANTASY COMICS; and Bhob Stewart, who concurrently published THE EC FAN BULLETIN, the first entirely comics-oriented fanzine. (The EC-fanzine became such a phenomenon that Richard Gheman wrote an article about it later for PAGEANT.) Today, little remains of the EC comics line but MAD, but those old comics are still regarded fondly by many as the first indication of the adult qualities comics *could* achieve—principally in the adaptations of Bradbury by gifted artists, and Kurtzman's documentaries of war.

In the early 1960's the comics companies rediscovered super-heroes just as a whole generation of sf fans were looking back nostalgically on the super-hero comics of their childhood. The result was a second cross-breeding of fandoms: Richard Lupoff (author of *One Million Centuries*, the Ova Hamlet stories in FANTASTIC, and *Edgar Rice Burroughs: Master of Adventure*) began publishing a fanzine in which, among other things, he ran a series of nostalgic reminiscences under the running title, "All In Color For a Dime." Lupoff was no adolescent, and his fanzine (which later won a Hugo) was primarily oriented towards sf fandom, but it set the spark to a waiting pile of tinder in the form of latent super-hero comics fandom. Most of those who jumped in to create a separate comics fandom *were* adolescent—either emotionally or literally—and very different values soon developed there. Most sf fans look down their noses at comics fans, and mostly for good reason: literacy seems to count for less in comics fandom than does a flair for crude imitations of comics art. Nonetheless, there

does exist a literate, intelligent sub-group within comics fandom, represented in such publications as GRAPHIC STORY MAGAZINE, ALTER EGO, and WITZEND.

The proliferation of fandoms hardly stops with comics fandom. The publication of FAMOUS MONSTERS OF FILMLAND in the late 1950's spawned a whole fandom of horror-movie buffs, out of which has sprung yet another group of fanzines, devoted primarily to films, and overlapping with film-fandom itself, which exists separately from sf fandom and may date as far back (for all I know). Again, in the case of the "little Ackermasters," a whole fandom has taken the idioms and publishing procedures of sf fandom—terming their publications "fanzines," etc.—largely in ignorance of their origins.

In each case this was made possible by the movement *into* one of these nascent fandoms of a sf fan who brought with him his traditions. In addition, there are the fandoms—like Tolkein fandom—which exist largely within the umbrella of sf fandom as distinct sub-fandoms. (Another is Burroughs fandom, and yet another Conan fandom—The Hyborean Legion.) Significantly, these fandoms tend to attract older members than do the comics or horror movie fandoms.

In recent years sf fandom has grown bloated: so many people are now participating in fandom that it is impossible to say, as one once might, "I know everyone in fandom at least by name." This has acted to attenuate fandom, to force it into smaller sub-groupings where familiarity with everyone is again possible. And this in turn has forced the additional proliferation of sub-fandoms as people have tended to collect around specific enthusiasms.

The problem, from any outside investigator's point of view, is that sf fans have never allowed themselves to be

confined in their opinions to science fiction and nothing else. As early as the mid-forties, Francis T. Laney, a leading Lovecraft fan of the day, was also discoursing with enthusiasm about jazz. By the mid-fifties it was jokingly said that you could not find a fanzine without references in it to jazz and sportscars—two popular enthusiasms among fans of that period. Other fans were discussing folk-music—Lee Hoffman single-handedly created folk-music fandom and its first fanzine, CARAVAN, I should add—politics, religion, and indeed almost anything which might appeal to an enquiring mind. If today's topics include rock music, drugs and sex, it is simply a reflection of the interest in these topics in our culture at large.

Inevitably, the words, the in-group terminology of fandom slipped beyond our control. People with absolutely no awareness of fandom began giving these words currency. Perhaps the ultimate manifestation of this was to be found in the New York sexpaper explosion—newsstand tabloids priced at 35¢ to 50¢ with titles like SCREW, PLEASURE and KISS, which publish pornography and quasi-pornography—in which several of these papers referred to themselves as "fanzines."

I cannot help wondering what the results

of Dr. Wertham's researches will be—and I cannot help resenting a little the no-doubt well-meaning interest of such organizations as the Twentieth Century Fund in fandom. It savors a little of having one's living room invaded by reporters, it smacks of an invasion of privacy. I am astonished that, when one considers the number of PhDs and other titled members of fandom, these pompous "investigations" always come from people totally outside our field and our interests. Fans—and professionals, like Jack Williamson—have done dissertations on sf, fantasy, and fandom for their degrees, but without much attendant publicity.

But, more troublingly, I am concerned about the investigation of a sub-microcosm of science fiction by a noted witch-hunter, by a man whose activities in recent years have appeared solely motivated towards the repression of various aspects of the public media. I am troubled by the fact that a man who is seeking to clinically rid our society of all manifestations of violence, including those found in the free expression of opinion, is loose in our midst. I cannot help but regard this man as a fanatic, and if his past actions are taken into regard, a dangerous fanatic.

—Ted White

(CONTINUED FROM PAGE 112)

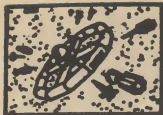
depending on the content of V's atmosphere, it could have a yellow or orange flash too, and if the planet revolves slowly enough, the flash could last for minutes.

We began this article with a tentacled alien asking about the green sunset. And here's the answer—he's seeing a green flash, but Tau Ceti V has a 190-hour day, so the flash lasts about six seconds. His father would have been able to answer the question, too—if he had read this column.

—Greg Benford & David Book

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